April 21, 1947

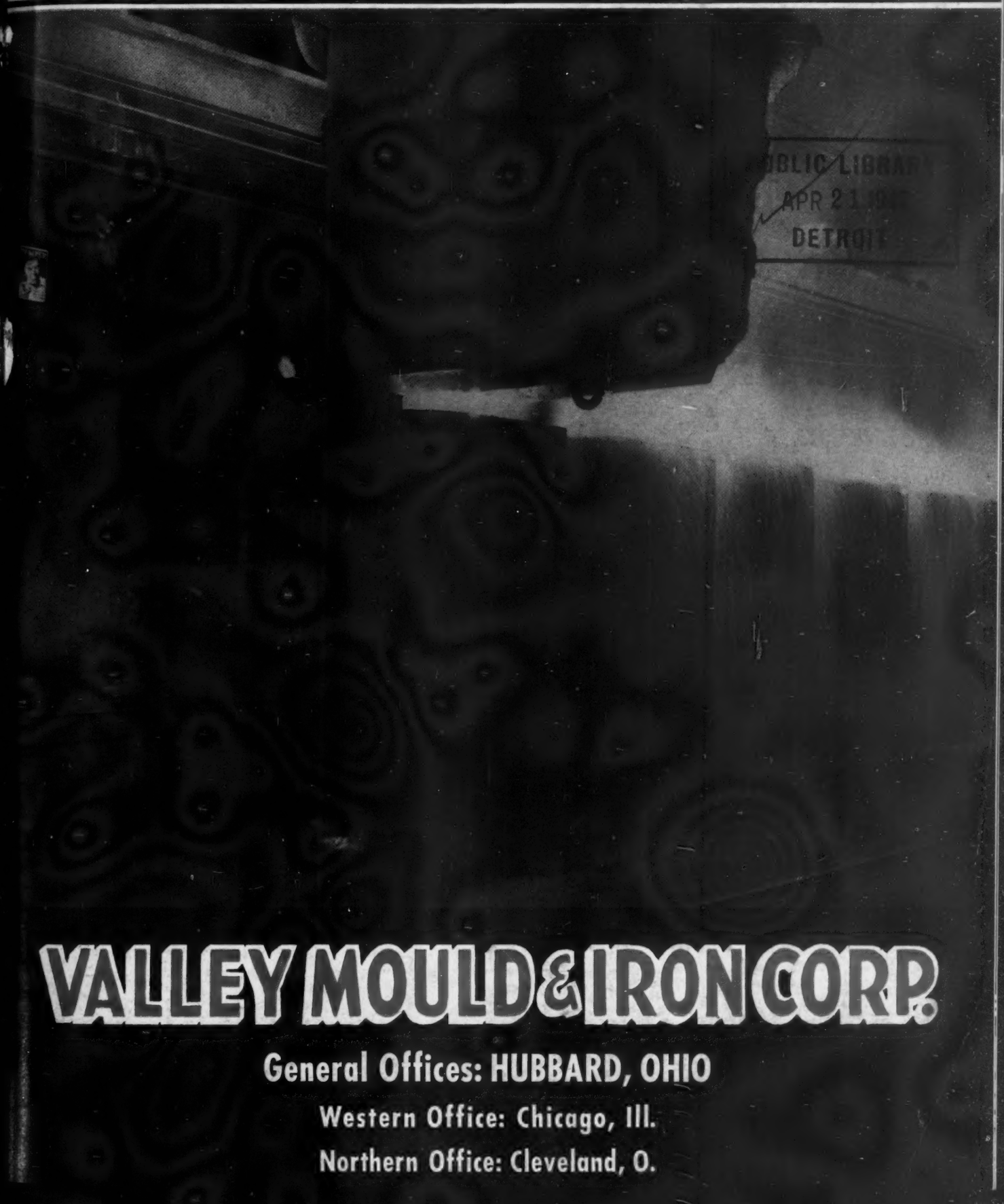
STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 51

CHNOLOGY DEPARTMENT



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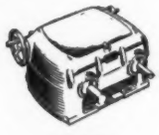
TEXROPE .. Greatest Name in V-Belt Drives

"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.

"Vari-Pitch" SHEAVES
Exact variations in speed, stationery or motion control.



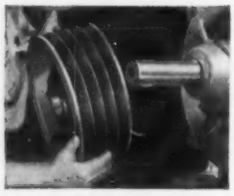
SPEED CHANGERS
Speed variations up to 375% at the turn of a crank.

ENGINEERING
Finest V-Belt engineering talent in the world—at your call.

TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

Save time . . . prevent damage to motor and shaft . . . with TEXROPE

"MAGIC-GRIP" SHEAVES



QUICKLY ALIGNED

Because it slides freely on the shaft, it's easy to line up the sheave accurately — for good alignment, smooth operating, longer belt life. It pays to standardize on "Magic-Grip" sheaves.

See Sweet's Catalog

SLIPS ON EASILY

Comes completely assembled. Tapered split bushing provides clearance for even over-size shafts — it's compressed and locked to the shaft with an all-around clamp grip by tightening three cap screws. Can be removed as easily as it goes on.

HERE'S A SHEAVE that goes on *fast*. Less labor cost — less downtime. But that's only part of the saving. There's no forcing or hammering to damage motor bearings — no set screws to mar the shaft. Locks on with a powerful clamp grip that prevents backlash or wobble. And . . . it costs no more than a standard heavy duty sheave of comparable materials and precision workmanship.

Texrope "Magic-Grip" sheaves are made in diameters from 5.4 to 48 inches, two to 12 grooves. They're engineered by Allis-Chalmers, originators of the multiple V-belt drive. For specifications, prices, call your nearest A-C dealer or office. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2221

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TIN MILL PRODUCTS

BETHCOLITE ★★★ Bethlehem hot-dip tinplate is cold-reduced on the modern continuous mill. In order to maintain high quality it must pass scrupulous inspection at each stage of its production. Long known to users of high-quality tinplate, BethColite is uniform in gauge and temper, forming qualities, and in its protective coating of lustrous tin.

BETHCOLITE ELECTROLYTIC ★★★ The widespread adoption of Bethlehem's electrolytic tinplate indicates a considerable increase in its future applications. Tin is deposited electrolytically on cold-reduced steel strip, then smoothed and brightened by fusion.

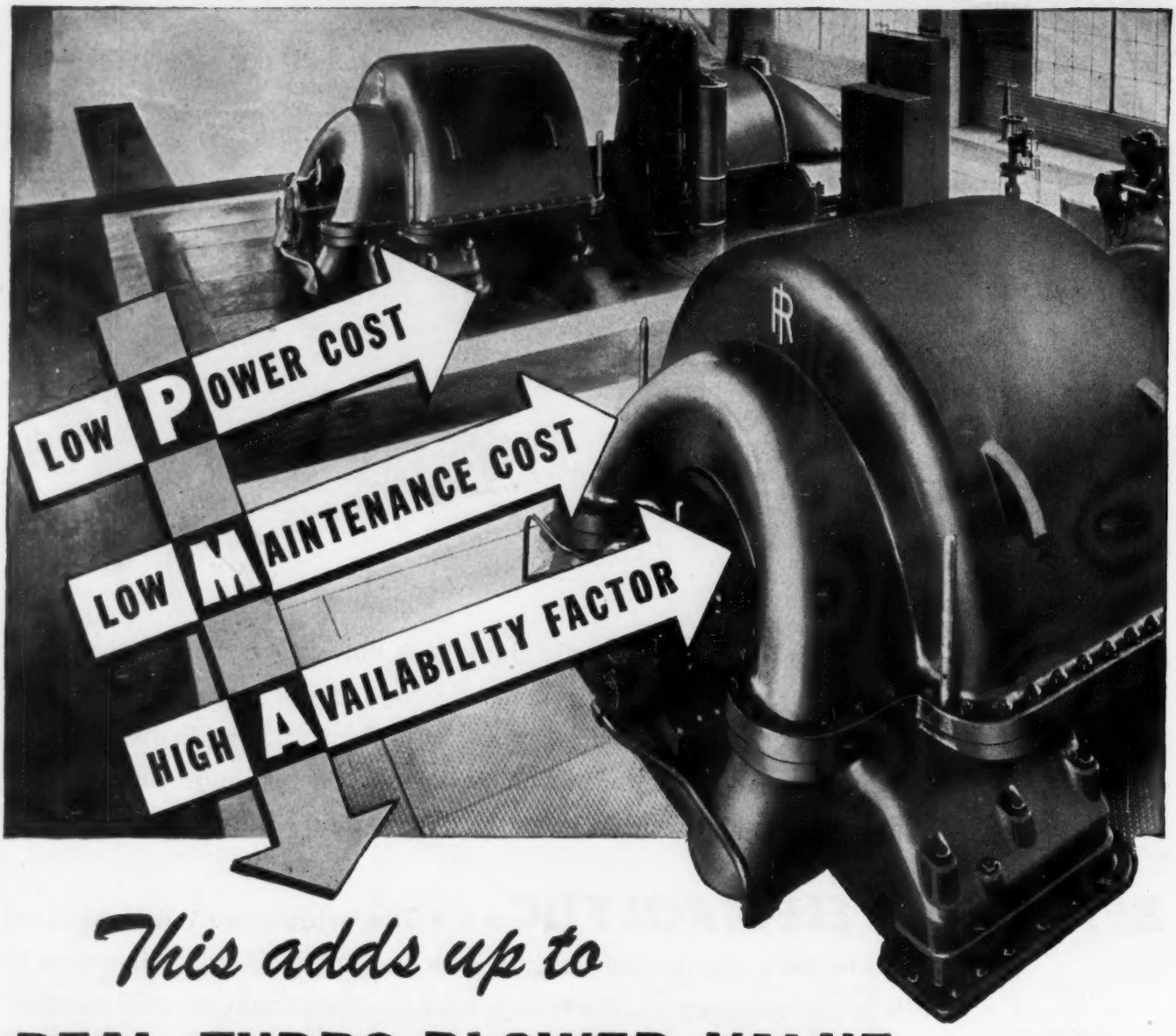
BethColite Electrolytic is ideal for general-line cans, certain sanitary cans, bottle crowns and screw caps. It is manufactured in three coating weights—.25, .50 and .75 pounds per base box.

BLACK PLATE ★★★ Bethlehem cold-reduced black plate is used where a coating of tin is not required. It is uniform in gauge, accurately sheared, and has excellent forming qualities. It is supplied in various finishes and tempers suitable for lacquering, enameling and lithographing.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation.



This adds up to

REAL TURBO-BLOWER VALUE

Of course, investigation of design features, construction details and materials will tell you the inside story of a turbo-blower, but the real measure of blower value is its record of low Power costs, low Maintenance costs and high Availability. This is value measured in dollars and cents . . . money you won't have to spend.

Looking at it this way, every Ingersoll-Rand turbo-blower (and we've built a lot of them) has proven its value with an excellent P-M-A record.

Ingersoll-Rand

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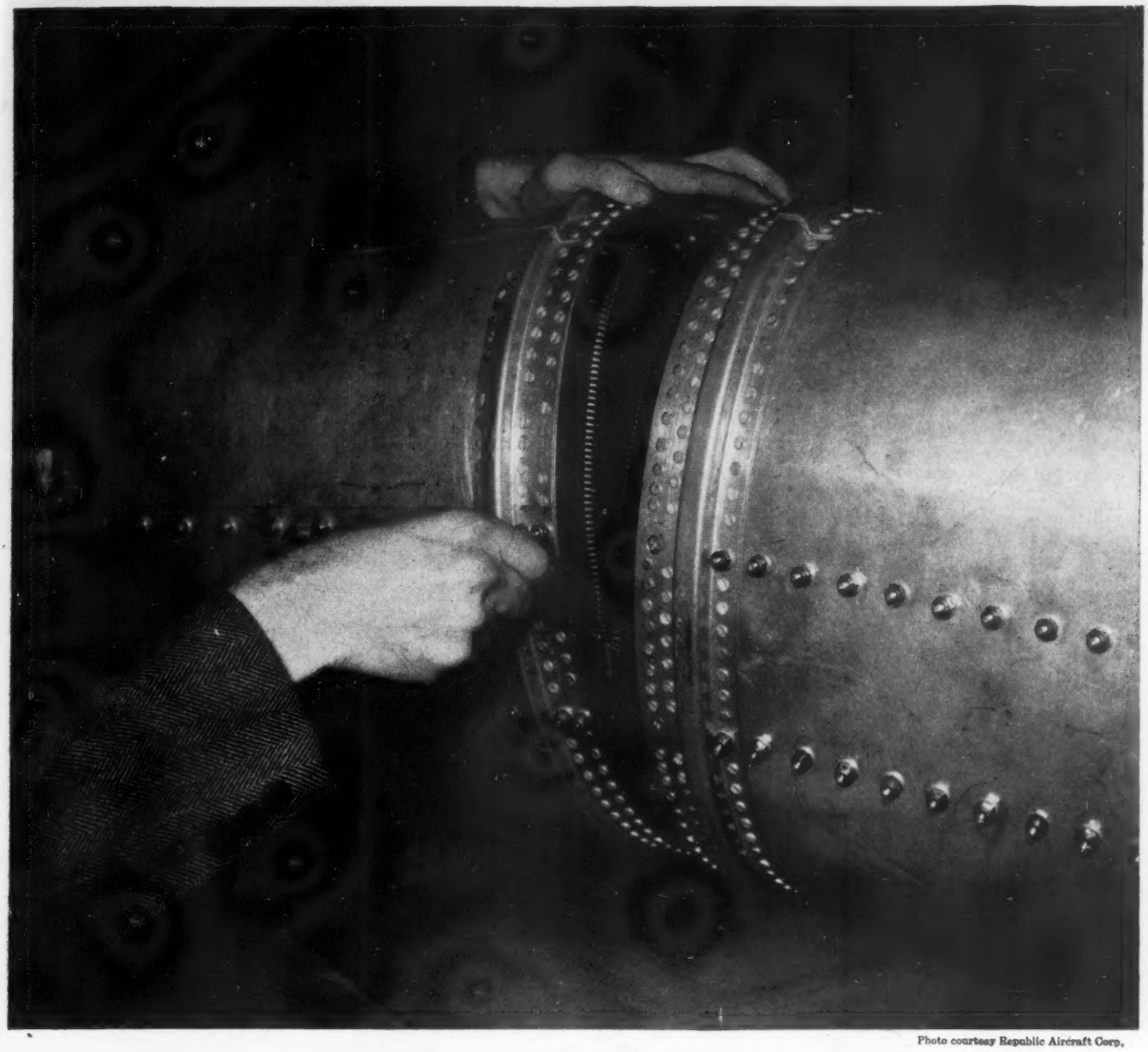

Photo courtesy Republic Aircraft Corp.

Now they zipper up the insides of airplanes

A typical example of B. F. Goodrich product development

LIKE the man who had three operations in the same place and finally told the surgeon to install a zipper next time, airplane engineers now use zippers so they can get at the insides of a plane easily and more quickly.

Designers of a new plane had heard of the new B. F. Goodrich zipper that not only closes but seals — it makes an air-tight, water-tight closing because of a rubber lip which flaps into place behind the zipper and allows nothing to escape through the metal teeth.

Ducts to carry air to engines have to be squeezed into wings. Behind the ducts are other parts — wiring, tubing, motors. When the plane is serviced, the ducts have to be taken out to get at whatever is behind them, and that was a major operation of removing the bolts and flanges that are necessary to keep every coupling air-tight. It took hours at every joint.

These airplane designers did away with all elaborate bolted couplings on their air ducts and simply joined pipe ends with one of these B. F. Goodrich zippers. Now to remove a section of duct a workman flips open the zipper at each end and lifts out the duct section — a job of seconds or minutes that used to take hours.

This new B. F. Goodrich sealing zipper has hundreds of possible industrial applications but it is so new they are in the development stage. If there is a use in your product or process, we urge a quick investigation before a competitor thinks of it first. *The B.F. Goodrich Company, Akron, Ohio.*

B.F.Goodrich

FIRST IN RUBBER

Behind the Scenes...

Help When Needed

We liked very much a story in Phil Hanna's column in the *Chicago Daily News* telling about the aftermath of a fire which completely destroyed the plant of Accurate Spring Mfg. Co. in that city. Seems that the company's management, its competitors, its customers and suppliers all started in to work on the rebuilding job with wim and wigor even as the ruins were still smoking. Telephone service was installed the same day in a hotel suite to take all calls on the company's number. Within a few hours five competing companies in the Chicago area had volunteered to supply springs to fill the Accurate orders, in some cases using Accurate personnel to help fill them. Within a week the company had set up temporary headquarters in a leased plant, and had started toolmakers working in some of its customers' plants. On the tenth day contracts were let for the rebuilding of the plant, and the same day a letter was on its way from company president F. D. Weber to all customers advising them that "it is likely we can take care of your requirements after April 10" (just 38 days after the fire!) In some ways, this metalworking industry of ours is a rough and tumble business, but when an emergency bobs its head up, the hand of friendship is there, and it's a big one.

Contents Noted

In the following few lines we'll make note of a few of our readers' comments. For example, Ben Hart of Allith-Prouty gives us a big Amen! on the write-as-you talk campaign. We now have two converts to that drive. Another loyal reader, A. C. Fickes of Newark (N. J.) says he understands our Pennsylvania Dutch, but thinks nobody else does. Apparently they all do, because nobody has questions asked us, yet. And a side note to Reid Jones of St. Louis—Yell across the street to John Garesche and tell him the answer to that equatorial railroad problem. And to Don MacNeil of Wheeling Steel, who ought to have his business cards printed like that if he doesn't, that was no strange coincidence, that was a case where our boy stepped into the breach to help out and managed to scoop himself in the process. Also, J. L. Brakefield, secretary of the Industrial Development division of the Birmingham Chamber of Commerce says he was burned up about the fires in southern hotels. Lots of other people got slightly singed in those affairs, but in all fairness to Mr. B we will announce here in print that we know darn well there were burning hotels north of the Line, too. The South may have a monopoly on colonels and juleps, but not on hotel fires. We'd do the same for any other peeved loyal reader, suh!

Oil Is Where, Etc.

For those of you who are inherently lazy (and who isn't) we will repeat a small tale we just heard, proving that it is often just as easy to accomplish your goal by accident as it is by much hard work. This time it was no less than the Standard Oil Co. (N. J.), which company has had crews drilling for oil for ten years near the Gulf of Suez. Down there in the country where the Garden of Eden was supposed to have been located there's a lot of oil, but it's apparently hard to find. Ten years' drilling had resulted in nothing but a lot of dry holes where oil should have been. The other day they were testing a rock formation in that area. They dug a hole to bring up some rock samples, and lo! there came the oil. They are not waiting to find out why, they're just rushing pumping equipment in there as fast as they can.

Moving Day At The Mines

If this week's book all comes out straight, it will be nothing short of a miracle. We have just been wandering around the ninth floor, where the editors live, and the second floor, where this sheet is printed, and there are large turmoils going on in both places. All the editors are moving around, like a couple of beginners playing chess, with offices being shifted up and down the hall like so many matchboxes. Can't find anybody. Every time we tried to find an editor we had to look behind a crate or under a bookcase, and when we did locate one we couldn't make ourselves heard over the hammering and sawing. Only guy who wasn't bothered was Editor "Pinky" Such, who was on the West Coast. Meanwhile, down on the second floor new machinery is being installed in the various typesetting departments, so we won't be surprised if half of this page comes out in the wrong type face. Just wait, though. When the job is done, we'll have more happy editors and more faster typesetters than you could shake an old board at.

Shrdlu

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STEEL

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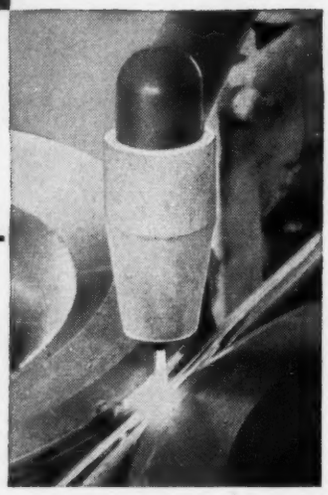
Linde's HELIARC process is a new and different method of welding with the electric arc, in which the welding action is shielded by an inert gas—usually argon.

Joints welded with the HELIARC process have exceptionally high quality. They are clean because HELIARC welding eliminates flux. Joints are so smooth, even, and neat that usually no finishing treatment of any kind is required.

Butt, lap, tee, corner, and angle joints are easily made on rolled, cast, extruded, or forged parts of stainless steel and practically all non-ferrous alloys of any commercially used thickness.

HELIARC welding can be done manually or with machines and is equally practical for mass production or job lots.



Linde service engineers are always available to help with problems of treating, cutting, joining, and forming metals.

Call or write any Linde office for information.

The word "Heliarc" is a trade-mark of The Linde Air Products Company.

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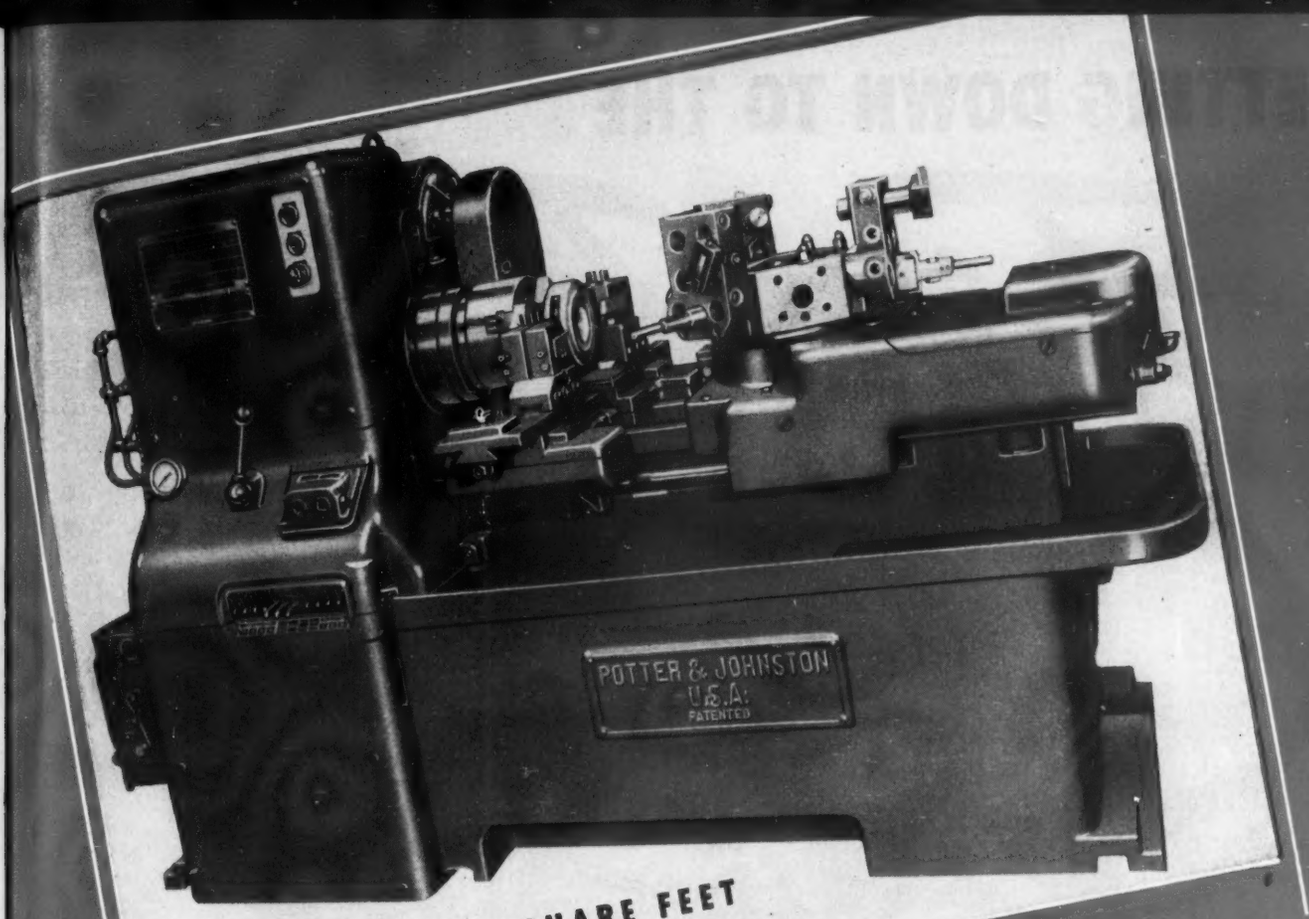

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Announcing the 3-U ~~SPEED-FLEX~~ AUTOMATIC TURRET LATHE

the latest Potter & Johnston development

I It has the necessary power and high speed demanded by carbide tooling, plus required rigidity and strength.

II Speed and efficiency of machine reduces cost per piece, despite greatly increased hourly pay of operator.

III Electro-pneumatic speed control; split second timing on change from rapid traverse to working speed and vice versa.

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V Minimum floor space (16 sq. feet) in relation to capacity of machine. This economy is important in planning the production line.

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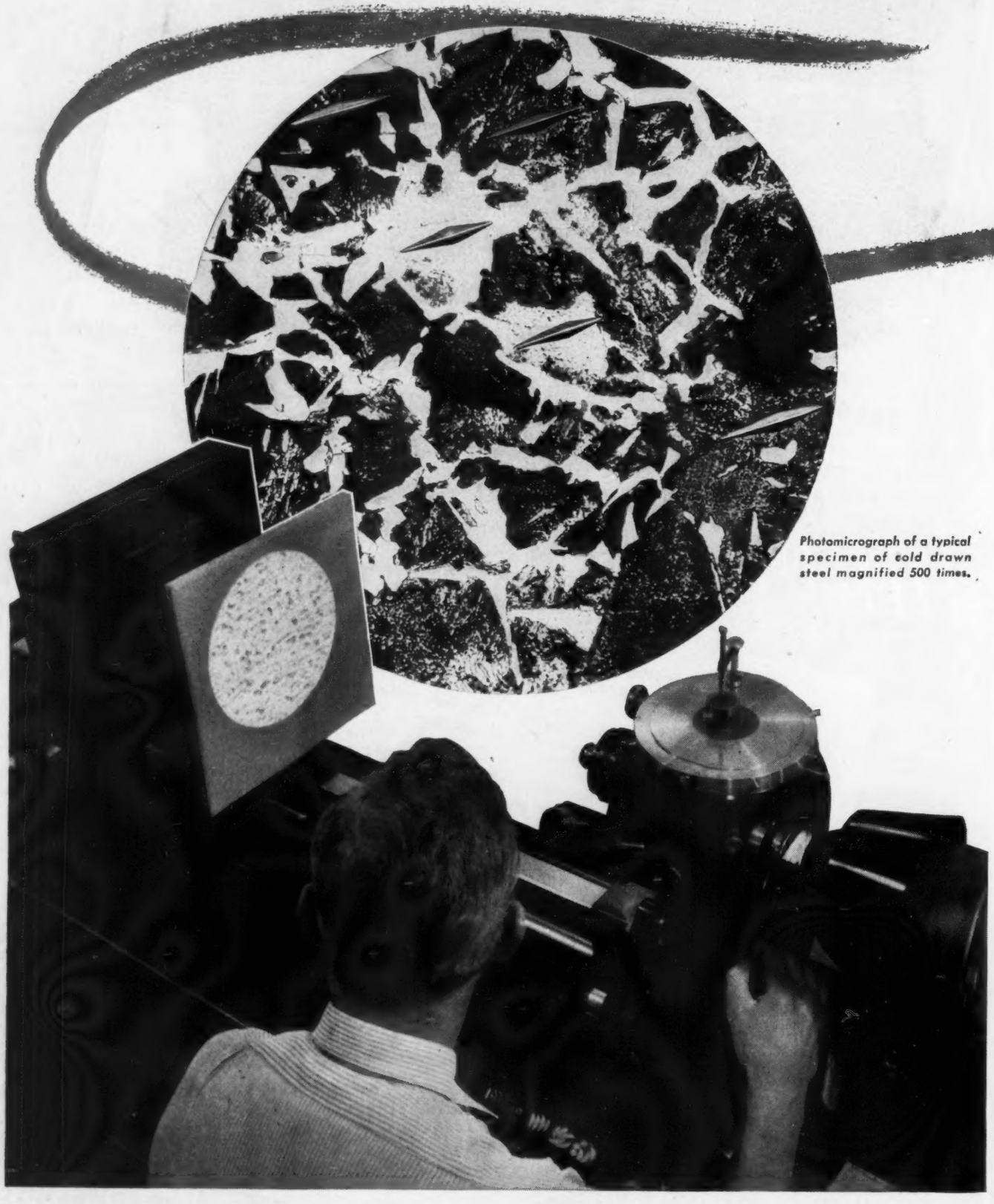
GETTING DOWN TO THE *Fine Points* OF



Photomicrograph of a typical specimen of cold drawn steel magnified 500 times.

MACHINABILITY

Look closely at the micro-portrait of a piece of steel on the opposite page and you'll find five diamond-shaped marks. They are tiny indentations made by the superfine point of a Tukon Hardness Tester. Their purpose is to measure the hardness of a single microscopic grain of steel. Although they appear about ¾ inch long as shown at this magnification of 500 times, they actually average only .0015-inch.

This study of the comparative hardness of individual grains and the areas between them now is part of the regular routine in the modern laboratories at Republic's Union Drawn Division. And it's a good example of how Union Drawn metallurgists "get down to fine points" in their unceasing research to improve the machinability of steels.

MACHINABILITY *always* comes first at Union Drawn—has had top ranking for 58 years. And because of this—

1. Republic Union Cold Drawn Steels have been stepped up in machinability time after time—permitting faster speeds and heavier feeds—producing finer machined surfaces.
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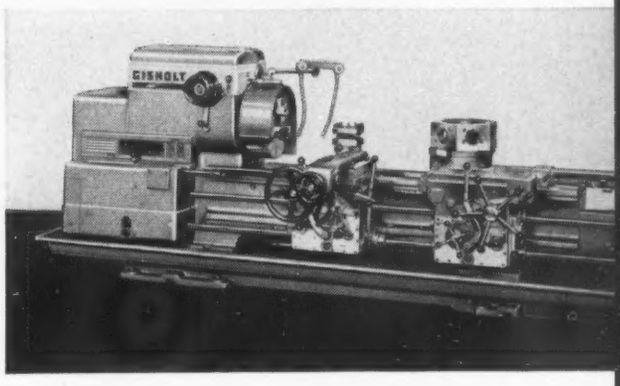
With a Gisholt you can obtain any one of 12 spindle speeds, instantly, without releasing the main drive clutch—without even stopping the spindle!

With the Hydraulic Speed Selector, you don't waste time and effort between cuts. Merely set the dial for the cutting speed you wish, then turn the hand wheel for the proper diameter. You pre-select the speed and diameter for the next cut while this one is being made. And when it's time to change—just tap the trip lever!

Easy? Of course. But more than that, the Gisholt Hydraulic Speed Selector is a big step toward maximum production at rock bottom cost.



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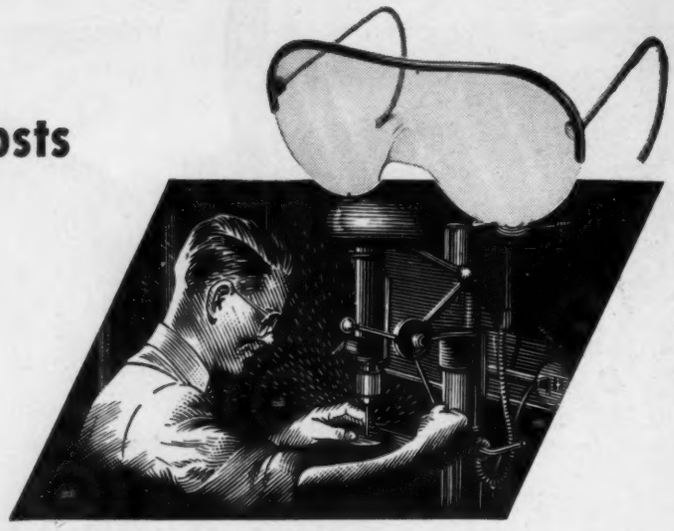

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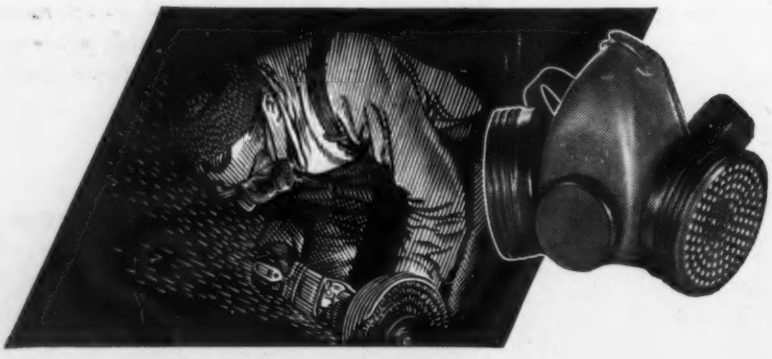

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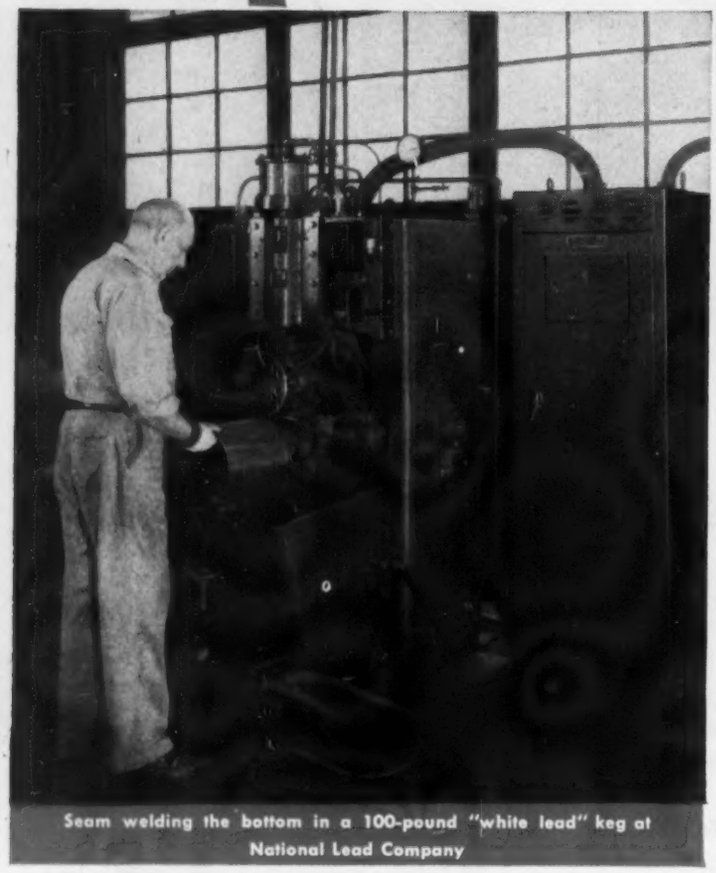
Kegs and Cans for Paint and Ammo.

GENERAL ELECTRIC WELDING CONTROLS Have Given National Lead *Better Quality in Less Time . . . Little Maintenance*



Seam welding the bottom in a 100-pound "white lead" keg at National Lead Company

Says Mr. Gerst, Plant Superintendent of the Steel Packaging Works of the National Lead Company: ***"We are well pleased with the General Electric controls. They have done a fine job.*** During the war, these controls were in continuous operation 16 hours per day, 6 days per week. Since we first installed them, they have required very little maintenance."

G-E synchronous precision controls helped increase National Lead's war production of 75 mm ammunition containers for the Government, and now, they are assuring a better quality of weld, reduced costs, and increased production of 100-pound kegs for packaging white lead in oil.

In addition to improved work quality and reduced production time and cost, this control has increased the life of the electrodes and reduced installation space.

A NEW, IMPROVED Line of Synchronous Precision Control

● Now, General Electric is featuring a new line of synchronous control which offers:

1. Savings in installation time—all controls are factory-wired, and included in one cabinet.

2. Easy installation—control cabinet is designed for side mounting on welding machine, within easy reach of operator.

3. Convenient servicing—cabled wiring and rack-mounted resistors provide easy access.

For further details, ask your local G-E office for bulletin GEA-4699.

HAVE YOU SEEN—

"This Is Resistance Welding," G.E.'s 30-minute, full-color movie? Your local utility or G-E office will be glad to arrange a free showing for you. Apparatus Department, General Electric Company, Schenectady 5, N. Y.

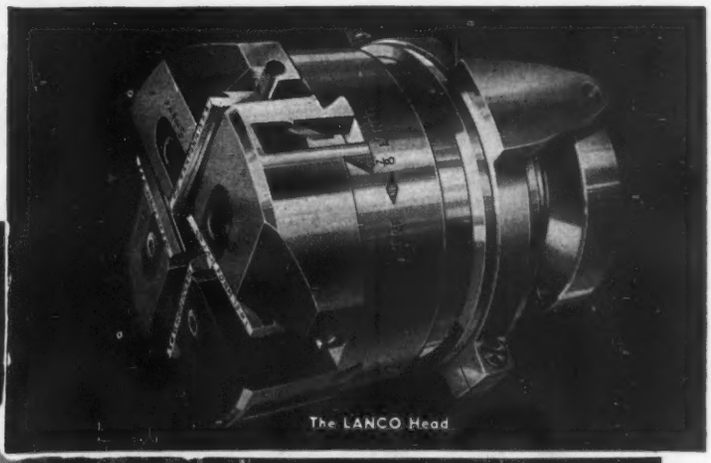
GENERAL ELECTRIC

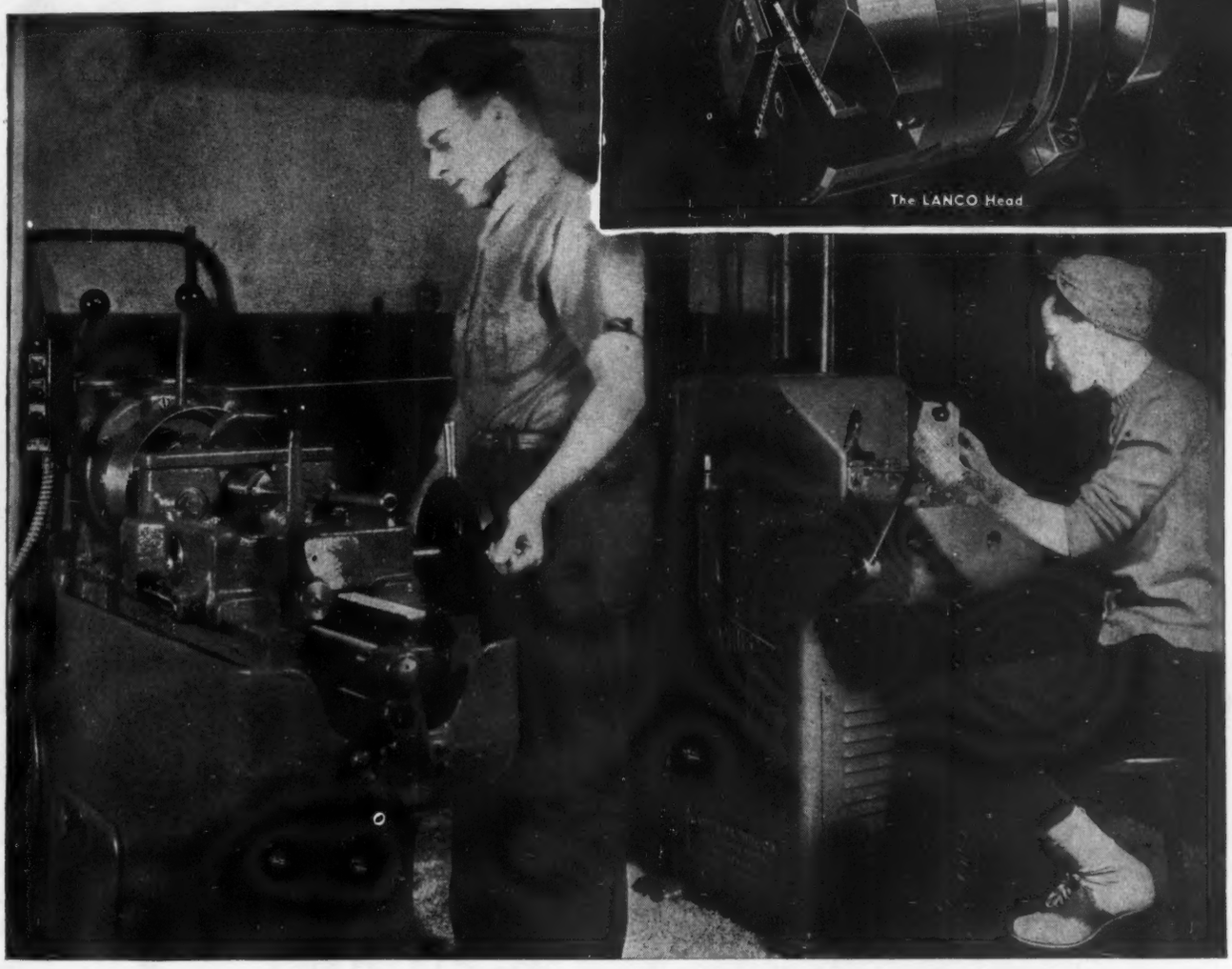
660-41

An Ideal Threading Combination

THE LANDMACO
for Large Precision Work

THE 3/8" HIGH SPEED
for Small Parts


The LANCO Head



For manufacturers of screw machine products and other small threaded components, the efficiency of this combination is clearly demonstrated by the production records of the machines illustrated. Threading 5/8" diameter 24 pitch threads to class three specifications, the LANDMACO Machine produces 600 pieces per hour. On some smaller threaded parts made from brass the 3/8" High Speed Machine has produced as high as 60,000 pieces per grind of the chasers.

Write for Bulletin No. H-91

LANDIS MACHINE COMPANY

WAYNESBORO · PENNA · U·S·A·

IF YOU USE . . . Aircraft Steels,
Nitralloy

UNITED STATES

Bearing Steels, Gear Steels, or Special Analysis Alloys

—we want your business!

MAYBE you've heard about the prominent manufacturer who when asked by a salesman acquaintance, "Mr. Jones, why don't we ever get any of your business?", made this candid reply, "You never asked me for it."

We don't want to make this mistake. So we're coming right out and asking for your orders. Not entirely out of self-interest either, but because we honestly believe that you'll find it to *your* advantage to buy alloy steels from Carnegie-Illinois.

Consider this. No other single producer can offer, or equal, Carnegie-Illinois Steel Corporation's *versatility* of alloy steel production. We are completely equipped to meet ALL of your alloy steel requirements as to analysis, form, condition and treatment, and particularly to the highest quality standards.

In both our Pittsburgh and Chicago District plants we have the producing and finishing equipment to supply you with forging ingots, blooms, billets, slabs, square bars, round bars, coils, spring steel flats, bar strip, special sections, plates, strip, sheet, sketch plates and structural shapes. This duplication of facilities expedites deliveries . . . reduces shipping time and costs . . . makes it possible to fully meet all specification requirements—whether you're located in the East or West.

And, to help you use these alloy steels most efficiently, we place at your disposal the best metallurgical talent available. These men—many of them recognized authorities in the field of steel metallurgy—can call upon the facilities of the most extensive steel research laboratories in America. Their recommendations to you can be entirely unbiased because they have the most comprehensive range of metallurgy's finest quality steels from which to fill your needs.

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
7-347

Did you know?

. . . A plant of the Carnegie-Illinois Steel Corporation was one of the first alloy steel producers in the United States. In 1892, fifty-five years ago, Homestead Steel Works made nickel armor for the battleship "Oregon", which saw service in the Spanish-American War.

. . . During World War II, Carnegie-Illinois developed and produced all the chromium-nickel-molybdenum-vanadium plate steel for welded torpedo flasks, thus eliminating the losses of steel and time consumed to manufacture flasks from large forgings, the usual practice.

. . . Devised and introduced hardenability bands as a means for closer control and heat treating response of both National Emergency Steels and regular standard steels.

U·S·S Carilloy Steels

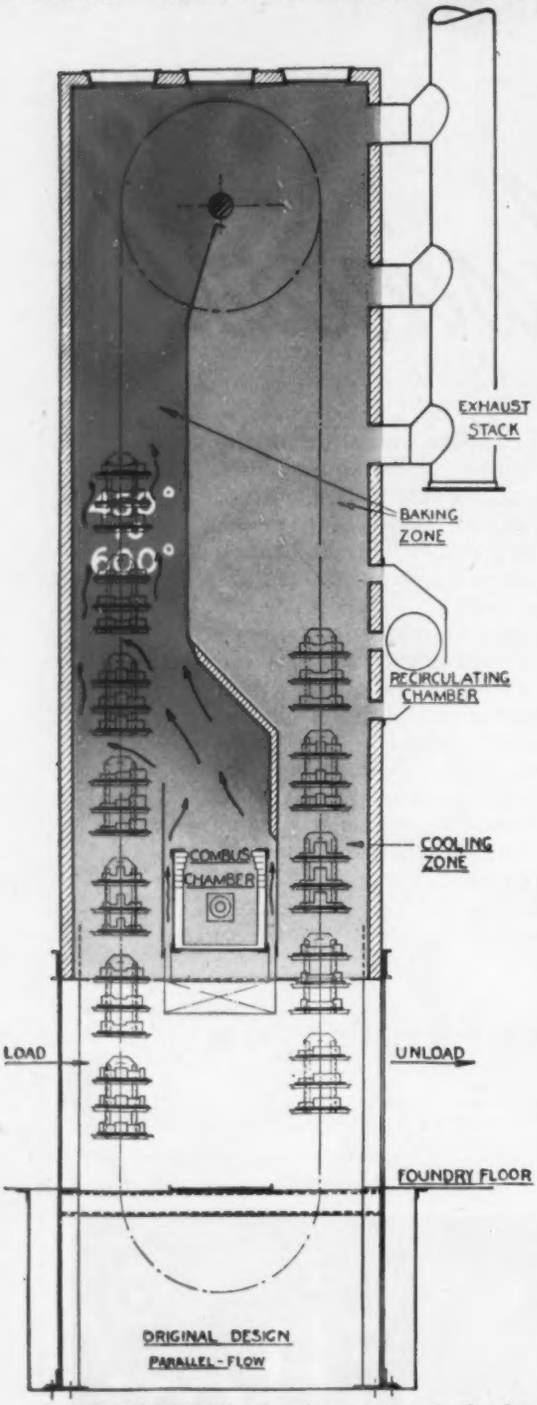
USS STEEL — UNITED STATES STEEL

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES
IN CHICAGO AND PITTSBURGH

S T E E L

BRING YOUR CORE-OVENS UP TO MODERN CROSS-FLOW EFFICIENCY

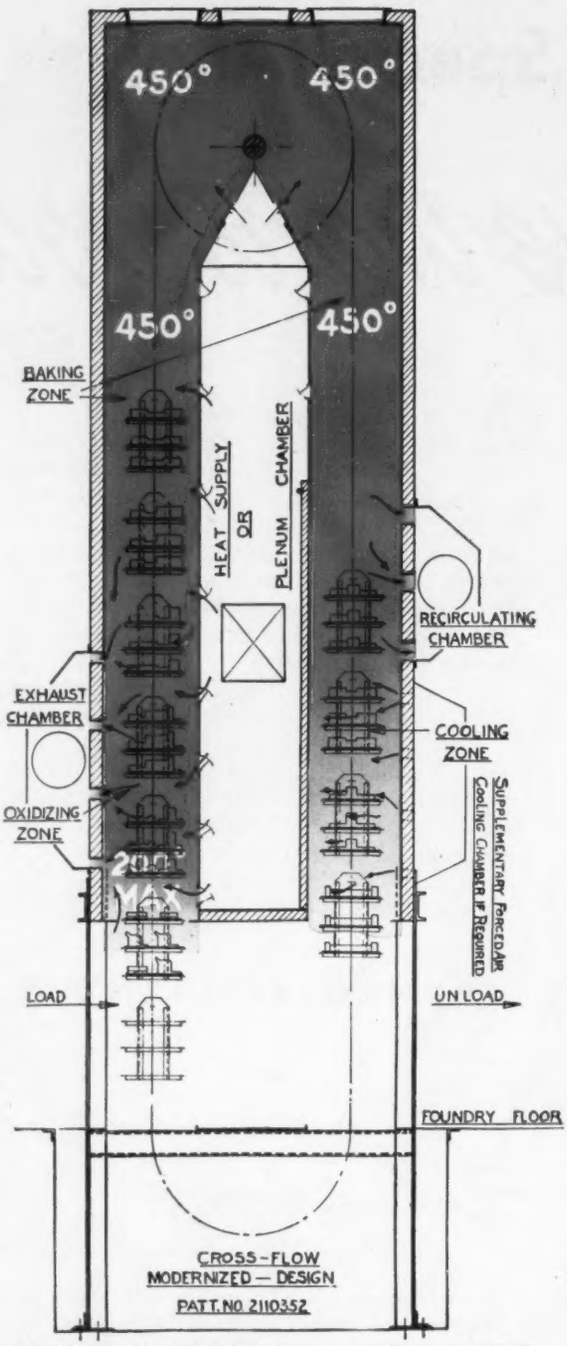


Cross-Flow Circulation and Recirculation for Batch or Continuous Ovens assures

Faster processing • More uniform baking • Better heat penetration • Less rejects • Closer temperature limits.

Oven ventilation is based on a parallel and cross-flow system. In the evaporating zone, care is exercised to keep the temperatures at a point that steam globules are not generated and retained within the body of sand after the surface is dried. In this zone, rapid circulation is provided at a soaking temperature, and directed so that the bases of the cores are dried at the same speed as the tops. Circulation is induced and controlled through fans and operating louvres.

After evaporation is completed the cores are subjected to a rapid heat, starting the oxidation of the oil binder. Oxidation is continued to the cooling zone. Through recirculation of heat, the fuel cost of operating the oven is at a minimum.



PLANT ENGINEERING: *Consulting assistance in plant layout to coordinate departmental operations, our experience dated from 1917 in this field.*

Such plant layout may be based on increasing production beyond present capacity, or it may be a rearrangement in this post-war period when operations are conducted under a new set of conditions.

MOTOR CLEANING EQUIPMENT: *Washing machines for cleaning tear-downs. Kerosene spray or similar solvent usually used as the cleaning medium.*

FORMED COWLINGS, PANELS, ETC.: *To your specifications, and of light metal alloys as required. Weldments and brazed assemblies may be under controlled atmosphere.*

PILOT EQUIPMENT: *Sample size equipment for development of heavy equipment.*

VERTICAL CORE BAKING OVENS • CONTINUOUS HORIZONTAL BAKING OVENS • BATCH TYPE CABINET OVENS • DRAWER OVENS

DETROIT SHEET METAL WORKS, 1296 OAKMAN BOULEVARD • DETROIT 6, MICHIGAN

DETROIT SHEET METAL WORKS

DETROIT - 6 - MICHIGAN

MORE BIG NEWS ABOUT MACHINE TOOLS

29

29 TYPES ADDED TO WAA LIST OF FIXED PRICE TOOLS

New fixed price policy now applies to a total of 60 important types and makes of general purpose tools. See the next 3 pages for details of this *high speed* sales program.

GOVERNMENT WAA SURPLUS

Floor Grinders—With Wheels over 6" Diameter and Driving Motors Other Than 110 Volt.

Boring Machine—Horizontal, Precision, Bridge Type, Single and Double End.

Chucking Machine—Bullard Mul-au-Matic Vertical, Multiple Spindle Type.

Chucking Machine—Six Spindle Automatic, Horizontal.

Drilling Machines—Deep Hole, Pratt and Whitney.

Drilling and Tapping Machine—Multiple Spindle Automatic.

Drilling Machine—Multiple Spindle, Fixed Center-Drills, Natco.

Gear Tooth Grinder—For Spur Gears, External and Internal (Formed Wheel Type Machine).

Gear Tooth Lapper—External and/or Internal Gear Tooth Lapping Machine.

Gear Tooth Shaver—Rack or Rotary Type, External or Internal Gear Shaver.

Contour Cutter Grinder.

Grinders, Cam and Crank Pin.

Grinders, Miscellaneous—Spline and Radius Grinders.

Lapping Machines—Flat, Norton Hydrolap.

Lathes, Production—Between Centers Automatic, Horizontal Single Spindle.

Slot Milling Machine.

Milling Machine—Spline.

Milling Machine—Bed Type, Vertical.

Planer—Craven Bros.

Screw Machine—Multiple Spindle Bar Type Automatic.

Vertical Shapers and Slotters.

Speed Lathes—All Types and Sizes.

The following types of tools were originally repriced on October 1st. They are listed again because additional makes and models have been put on the new fixed price schedule.

Gear Hobber—Horizontal.

Gear Hobber—Vertical, Muir.

Gear Tooth Grinder—Generating Type, For Spur and Helical Gears.

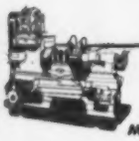
Milling Machine—Bed Type, Horizontal Spindle, Plain or Rise and Fall, Simplex or Duplex.

Milling Machine—Vertical, Knee Type Except Bench Models.

Tapping Machine—Vertical, Single or Multiple Spindle.

bargains like this ready for IMMEDIATE DELIVERY

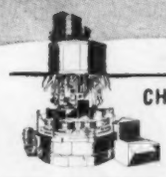
GOVERNMENT WAA SURPLUS



LATHES, PRODUCTION—BETWEEN CENTERS AUTOMATIC, HORIZONTAL SINGLE SPINDLE

Manufacturer: **JONES AND LAMSON MACHINE CO., SPRINGFIELD, VT.**

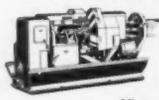
MODEL	SIZE AND CAPACITY	SALES PRICE
8" Fay Automatic	8" swing x 21" center to center	$ 796.00
8" Fay Automatic	8" swing x 33" center to center	843.00
8" Fay Automatic	8" swing x 45" center to center	889.00
12" Fay Automatic	12" swing x 21" center to center	$1195.00
12" Fay Automatic	12" swing x 33" center to center	1261.00
12" Fay Automatic	12" swing x 45" center to center	1330.00
12" Fay Automatic	12" swing x 63" center to center	1465.00
12" Fay Automatic	12" swing x 81" center to center	1636.00
16" Fay Automatic	16" swing x 21" center to center	$2079.00
16" Fay Automatic	16" swing x 33" center to center	2148.00
16" Fay Automatic	16" swing x 51" center to center	2284.00
20" Fay Automatic	20" swing x 25" center to center	$1569.00
20" Fay Automatic	20" swing x 37" center to center	1638.00
24" Fay Automatic	24" swing x 69" center to center	2717.00
Manufacturer: **LODGE AND SHIPLEY MACHINE TOOL COMPANY, CINCINNATI, OHIO**		
No. 1 "Duomatic"	16" swing over bed, 10" over slides, 39" centers	$1078.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 15" centers	1772.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 27" centers	1826.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 39" centers	1879.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 51" centers	1932.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 63" centers	1986.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 75" centers	2039.00
Manufacturer: **SENECA FALLS MACHINE COMPANY, SENECA FALLS, N. Y.**		
IMP Lo-Swing	4-1/2" swing over front and rear carriage, 8" centers	$ 746.00
IMP Lo-Swing	4-1/2" swing over front and rear carriage, 12" centers	769.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 10" centers	768.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 16" centers	815.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 22" centers	$ 854.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 34" centers	965.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 46" centers	1021.00
R-14 Lo-Swing	11-1/2" swing over front and rear carriage, 34" centers	2627.00
Manufacturer: **SUNDSTRAND MACHINE TOOL COMPANY, ROCKFORD, ILL.**		
8 Automatic Lathe	8" swing x 15" center to center	$ 715.00
8 Automatic Lathe	8" swing x 21" center to center	757.00
8 Automatic Lathe	8" swing x 28" center to center	816.00
10 Automatic Lathe	10" swing x 16" center to center	$ 976.00
10 Automatic Lathe	10" swing x 22" center to center	1020.00
10 Automatic Lathe	10" swing x 34" center to center	1128.00
10 Automatic Lathe	10" swing x 46" center to center	1242.00
12 Automatic Lathe	12" swing x 22" center to center	$1126.00
12 Automatic Lathe	12" swing x 34" center to center	1233.00
12 Automatic Lathe	12" swing x 46" center to center	1349.00
15 Automatic Lathe	15" swing x 22" center to center	$1102.00



CHUCKING MACHINE—AUTOMATIC, VERTICAL, MULTIPLE SPINDLE TYPE

Manufacturer: **BULLARD COMPANY, BRIDGEPORT, CONN.**

MODEL	SIZE AND CAPACITY	SALES PRICE
D "Mult-au-Matic"	34" swing 4 spindle	$19393.00
D "Mult-au-Matic"	8" swing 6 spindle	6136.00
D "Mult-au-Matic"	12" swing 6 spindle	6506.00
F "Mult-au-Matic"	7" swing 12 spindle	6380.00



SCREW MACHINE—SINGLE AND MULTIPLE SPINDLE BAR TYPE AUTOMATIC

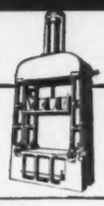
Manufacturer: **CONE AUTOMATIC MACHINE COMPANY, WINDSOR, VT.**

MODEL	SIZE AND CAPACITY	SALES PRICE
SX Automatic Screw Machine	1-1/2" diameter bar capacity, 6 spindle	$3066.00
SN Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3307.00
SD Automatic Screw Machine	2-1/4" diameter bar capacity, 6 spindle	3446.00
SE Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	3932.00
SF Automatic Screw Machine	3-1/2" diameter bar capacity, 6 spindle	4432.00
WW Automatic Screw Machine	1-1/2" diameter bar capacity, 8 spindle	$3065.00
XX Automatic Screw Machine	1-7/8" diameter bar capacity, 8 spindle	3132.00
DD Automatic Screw Machine	1-1/2" diameter bar capacity, 8 spindle	2360.00
VB Automatic Screw Machine	1-5/8" diameter bar capacity, 8 spindle	3132.00
MM Automatic Screw Machine	1-7/8" diameter bar capacity, 8 spindle	2529.00
Manufacturer: **GREENLEE BROTHERS AND COMPANY, ROCKFORD, ILL.**		
1" Automatic Screw Machine	1" diameter bar capacity, 6 spindle	$2216.00
1-5/8" Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	2636.00
2" Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3269.00
Manufacturer: **THE NATIONAL ACME COMPANY, CLEVELAND, OHIO**		
3/8" R-6 Automatic Screw Machine	3/8" diameter bar capacity, 6 spindle	$2105.00
9/16" RA-6 Automatic Screw Machine	9/16" diameter bar capacity, 6 spindle	1602.00
1" RA-6 Automatic Screw Machine	1" diameter bar capacity, 6 spindle	3036.00
1-1/4" RA-6 Automatic Screw Machine	1-1/4" diameter bar capacity, 6 spindle	3465.00
1-5/8" RA-6 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	$4118.00
1-5/8" RB-6 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	4118.00
2" RA-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	4350.00
2" RB-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	4350.00
2" RAS-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	$4350.00
2-5/8" RA-6 Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	4969.00
2-5/8" RB-6 Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	4969.00
3-1/2" RA-6 Automatic Screw Machine	3-1/2" diameter bar capacity, 6 spindle	5781.00
Manufacturer: **NEW BRITAIN-GRIDLEY MACHINE COMPANY, NEW BRITAIN, CONN.**		
GD Automatic Screw Machine	5/8" diameter bar capacity, 6 spindle	$1778.00
204 Automatic Screw Machine	5/8" diameter bar capacity, 6 spindle	1059.00
GD Automatic Screw Machine	1" diameter bar capacity, 6 spindle	2741.00
G1 Automatic Screw Machine	1-3/8" diameter bar capacity, 6 spindle	$2299.00
G1 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	3373.00
G1 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3560.00
G1 Automatic Screw Machine	2-1/4" diameter bar capacity, 6 spindle	3662.00

CHUCKING MACHINE—SIX SPINDLE AUTOMATIC, HORIZONTAL

Manufacturer: **NEW BRITAIN-GRIDLEY MACHINE COMPANY, NEW BRITAIN, CONN.**

MODEL	SIZE AND CAPACITY	SALES PRICE
652 Automatic, Work Rotating Chucker	2" swing	$2682.00
654 Automatic, Work Rotating Chucker	3-1/2" swing	2885.00
65 Automatic, Work Rotating Chucker	5-3/4" swing	5058.00
665 Automatic, Work Rotating Chucker	6-1/2" swing	5139.00
675 Automatic, Work Rotating Chucker	7-1/2" swing	$5313.00
10 Automatic, Work Rotating Chucker	9" swing	4863.00
10 Automatic, Work Rotating Chucker	10-1/4" swing	5458.00
635 Automatic, Work Rotating Chucker	5-3/4" swing	5058.00
Manufacturer: **THE BAIRD MACHINE COMPANY, BRIDGEPORT, CONN.**		
7SH Automatic, Work Rotating Chucker	7" swing	$3880.00



FORGING MACHINERY AND HAMMERS—IMPACT STAMPING TYPE

Manufacturer: **CHAMBERSBURG ENGINEERING COMPANY, CHAMBERSBURG, PA.**

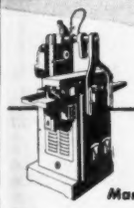
MODEL	SIZE AND CAPACITY	SALES PRICE
Elpic Coco Stamp	30" R to L, 24" F to B, 36" stroke	$1343.00
Elpace Coco Stamp	48" R to L, 36" F to B, 42" stroke	2074.00
Elplain Coco Stamp	48" R to L, 48" F to B, 42" stroke	2455.00
Elpoint Coco Stamp	66" R to L, 36" F to B, 48" stroke	2471.00
Elplank Coco Stamp	66" R to L, 48" F to B, 48" stroke	$3684.00
Elplanet Coco Stamp	66" R to L, 60" F to B, 48" stroke	3896.00
Elpale Coco Stamp	96" R to L, 48" F to B, 48" stroke	3922.00
Elpublic Coco Stamp	90" R to L, 60" F to B, 48" stroke	4642.00

25% OR MORE BELOW USED MARKET

— purchasing can be done either directly with the 33 WAA Regional Offices or with one of the 3,000 "approved" dealers.

— one low price everywhere — any regional office, dealer or site sale.

— no waiting for priorities, complicated figuring of prices or other delays.



MILLING MACHINE—BED TYPE, HORIZONTAL SPINDLE PLAIN OR RISE AND FALL, SIMPLEX OR DUPLEX

Manufacturer: **BROWN AND SHARPE MFG. CO., PROVIDENCE, R. I.**

MODEL	SIZE AND CAPACITY	SALES PRICE
000 Plain (Simplex)	6" table travel x 8" width	$ 394.00
10 Plain, Electrically Controlled (Simplex)	12" table travel x 10" width	789.00
12 Plain, Electrically Controlled (Simplex)	18" table travel x 12" width	969.00
12 Plain, Electrically Controlled (Simplex)	24" table travel x 12" width	1009.00
Manufacturer: **CINCINNATI MILLING AND GRINDING MACHINES, INC., CINCINNATI, O.**		
34-36 Plain, Hydromatic	36" table travel x 16" table width	$1350.00
35-48 Plain, Hydromatic	48" table travel x 20" table width	1918.00
56-80 Plain, Hydromatic	90" table travel x 24" table width	2807.00
4-36 Duplex, Hydromatic	36" table travel x 16" table width	2471.00
Manufacturer: **KEARNEY AND TRECKER CORPORATION, MILWAUKEE, WIS.**		
1210 Automatic, Simplex	18" table travel x 12" table width	$1206.00
1842 Automatic, Simplex	42" table travel x 18" table width	1623.00
1854 Automatic, Simplex	54" table travel x 18" table width	1662.00
Manufacturer: **KENT-OWENS MACHINE COMPANY, TOLEDO, OHIO**		
1-8 Plain, Hydraulic, Single Spindle	8" table travel x 9" width	$ 454.00
2-20-DS Plain, Hydraulic, Double Spindle	20" table travel x 12" width	1433.00

DRILLING MACHINE—MULTIPLE SPINDLE WITH CENTRAL DRIVING UNIT

Manufacturer: **NATIONAL AUTOMATIC TOOL CO., INC., RICHMOND, IND.**

These prices apply only to exact model listed and cover types with nonadjustable fixed center drill spindle or spindles which are all driven by a separate motor mounted directly above spindle gear box and moving vertically with the gear box.

MODEL AND DESCRIPTION	SALES PRICE
Mod. B-2A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. B-3A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00
Mod. B-4A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	2196.00
Mod. B-5A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	4052.00
Mod. 2-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. 3-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00
Mod. 4-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	2196.00
Mod. 5-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	4052.00
Mod. 2-AH Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. 3-AH Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00

The above prices do not apply to general purpose adjustable Multi-Spindle Natco drilling machines equipped with slip spindle plates or with standard adjustable spindles.

ALL TOOLS SUBJECT TO PRIOR SALE

Get this new catalog list

If you can use any of the 29 additional types of production tools on which fixed prices have been established, send today for WAA's new (January 15) Fixed Price Machine Tool Catalog giving all sizes and new fixed prices.

PLUS—Catalog of sizes, models and prices of 31 types of production tools previously (October 15) placed on the fixed price list. For copies of one or both of these catalogs, simply write, phone or wire the nearest WAA office listed on the 4th page of this advertisement.

EXPORTERS: Your business is solicited. Much material which is surplus in the United States is urgently needed or is readily saleable in other countries. Watch for other offerings; many of them may be of interest to your clients.

WAR ASSETS ADMINISTRATION

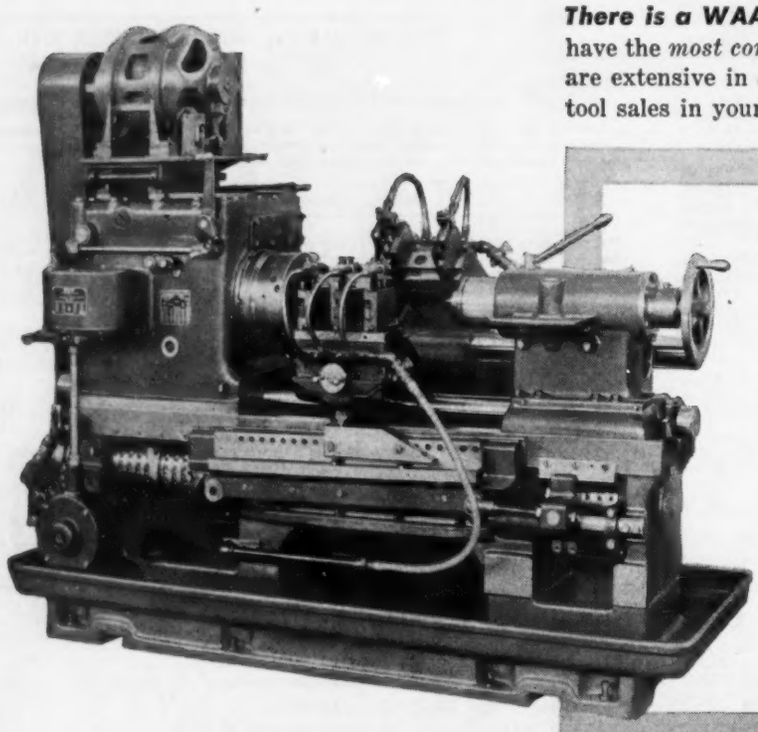
GOVERNMENT WAA SURPLUS

One Call ...

TO BUY AN
GET DELIVER

To purchase the machine tools you need, visit any of the WAA offic listed below, your regular machine tool dealer, or any WAA Machi Tool Site Sale advertised in your local paper. You can arrange *on t spot* for immediate delivery. Shipping time must be allowed for, ho ever, when the particular machine you want is located elsewhere. B you will not have to wait for lengthy clearances of priorities or natio wide search of stocks. All machines are available for immediate sa

There is a WAA office near you — Offices listed below with a st have the *most complete* inventories of surplus machine tools—but stoc are extensive in *all* offices. Watch your newspaper for special machi tool sales in your area.



HOW NEW PRICE POLICY WORKS

New prices take into consideration the estimated cost of engineering and rebuilding the tools. For example:

Here is how WAA's new price has been set on a 20 inch Fay Automatic Production Lathe, 37" center to center, a Jones and Lamson machine. WAA code No. 3416-61-62-57.

Price (New)	$7,059.00
Previous WAA Sales Price (based on depreciation primarily)	3,529.00
Average Market Value	2,130.00
New WAA Fixed Sales Price	1,638.00
Available for Rebuilding	$ 492.00

MACHINE TOOL SALES DIVISION

OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • *Boston • Charlotte • *Chicago • Cincinnati • *Cleveland Denver • *Detroit • Grand Prairie, Tex. • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • *New York • Omaha • *Philadelphia Portland, Ore. • Richmond • Salt Lake City • *St. Louis • San Antonio • San Francisco • Seattle • Spokane • Tulsa

686-3

ONE OIL SOLVED TWO PROBLEMS...

when we switched to Tycol dual-purpose oils

For CUTTING and LUBRICATION

"Stepped up machining speed 14% . . .
Increased tool life 3 times . . .
Jumped production 25% . . .
Improved finishes . . .
Excellent machine lubricant . . ."

—is how the superintendent of a large manufacturing plant described a few of the advantages of Tycol Dual-Purpose Oil. "As a matter of fact," he said, "this oil *not only* does the work of *two* separate cutting and lubricating oils—but does it *better*"!

For complete data on Tycol "Dual-Purpose", get in touch with your nearest Tide Water Associated office today.

TYCOL
INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C.
Pittsburgh • Philadelphia

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N. Y.

Tide Water Oil Company of Canada, Ltd. · Toronto, Montreal

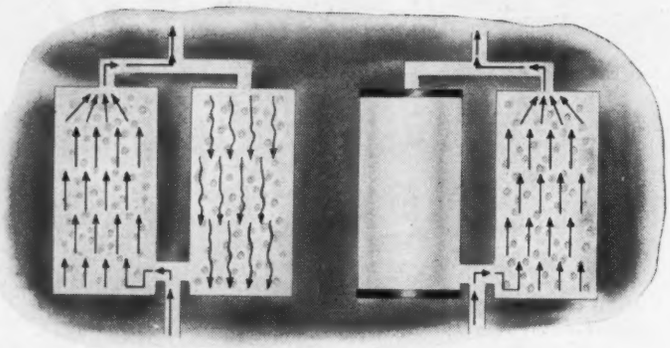
LUBRICATION—"ENGINEERED TO FIT THE JOB"

here's why we say,

"send Lectrodryer* your DRYing problems"

Of course, anybody can design a dryer

The principle's simple: Pass the wet air, gas or organic liquid through a drying agent. When that column has picked up a healthy charge of moisture, pass it through the second column while you regenerate the first with heat.



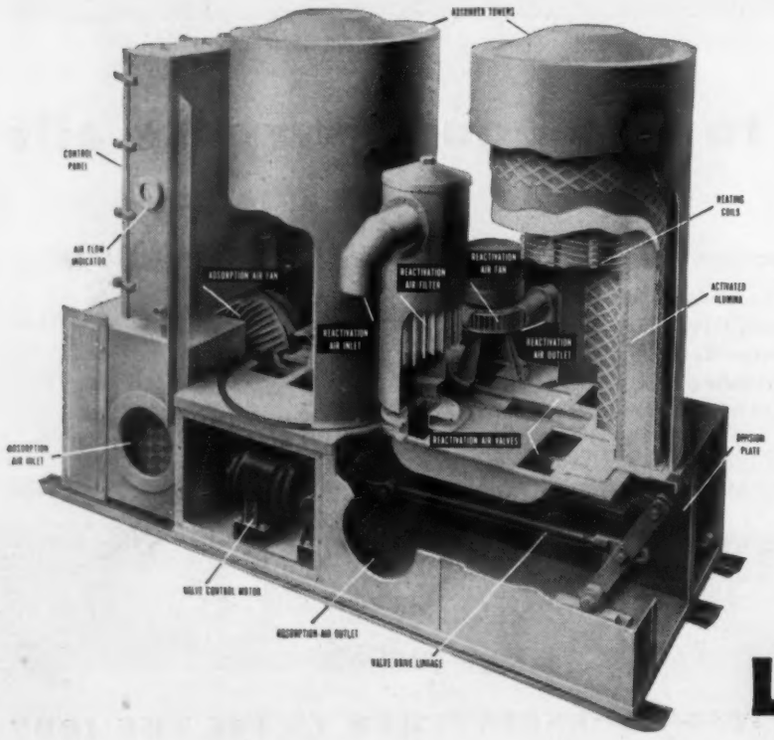
Its many elements combine to make Lectrodryer a safe, dependable, efficient DRYing machine.

But DRYing needs a lot of know-how

"What materials can we dry? In what volumes and at what speeds? What DRYness should we aim for? What adsorbent should we use and in what quantity?" And so on—

Lectrodryer has that know-how, based on many years of solving DRYing problems for many industries. And there's usually a standard Lectrodryer ready to handle the job. No need for your engineers to take valuable time figuring out unfamiliar drying tasks.

For DRYing help, write Pittsburgh Lectrodryer Corporation, 323 32nd Street, Pittsburgh 30, Pennsylvania.



LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

LECTRODRYER

*REGISTERED TRADEMARK U. S. PAT. OFF.

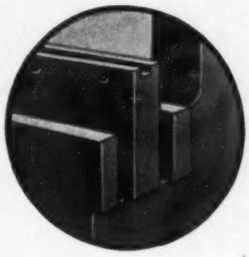
HERE'S YOUR EFFICIENCY EXPERT!

Dual

The All-Steel Press Brake that Does not one, but MANY Jobs!

. . . For Bending, Forming, Blanking and Multiple Punching! . . .

The DUAL Bolster is the secret of its versatile efficiency! All ready for *instant* use on varied jobs!



Step up your production with Dual! It's the amazing, new all-steel Press Brake with a two-way (Dual) bolster that makes it possible to handle many jobs quickly and efficiently! Use it for bending and brake work when bolster is in vertical position. When horizontal, it can be used for forming, notching and multiple punching . . . and the opening in bed allows large blanks to drop through.

Manufactured in six series and 30 different sizes with capacities ranging from 5 ft. of 16 gauge to 20 feet of ½ inch steel plate.

Write Today **FOR BOOKLET !..**

Dual PRESS COMPANY

2812 IOWA AVENUE • ST. LOUIS 18, MO.

Fine Quality Steel...

Hundreds of manufacturers in the Middle West turn to Granite City for fine quality steel tailor-made to their own particular specifications, for Granite City is the logical supplier for this great industrial area.

The facilities of the Granite City Steel Co. have always been large enough to employ the most modern manufacturing processes developed by the steel industry... yet small enough to pay scrupulous attention to details that produce steel of fine quality. For the best in quality, specify *Granite City Steel.*

Granite City Steel Company

GRANITE CITY, ILLINOIS

Chicago • Cleveland
Houston • Indianapolis
Kansas City • Los Angeles

SINCE GRANITE CITY STEEL 1878

Milwaukee • Memphis
Minneapolis • Moline
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HOT ROLLED SHEETS • COLD ROLLED SHEETS • STRIPLATES • STAINLESS-CLAD • TIN PLATE
TERNE PLATE • ELECTRICAL SHEETS • TIN MILL PRODUCTS • PORCELAIN ENAMELING SHEETS

Blasting Away

WITH ALL 3 BARRELS . . .
TO LOWER THE COSTS OF CLEANING

When Lynchburg Foundry Company installed its new mechanized molding unit (automatic wherever practical), it became necessary to replace its tumbling mills with cleaning equipment capable of keeping pace with the faster molding. Pangborn's ROTOBLAST* Barrel was selected—with twenty-five hundred to five thousand pounds capacity.

Results justified the choice. Cleaning kept pace . . . breakage virtually vanished . . . finishing time per piece was cut to a fraction.

So—another ROTOBLAST Barrel was installed (and a Pangborn Air-blast Room for the larger pieces). Recently—a *third* ROTOBLAST Barrel was ordered.

Now? Blast-cleaning output averages 160 tons a day, with 200 tons not unusual. Lynchburg Foundry—with quality and costs in balance—faces the future with confidence!

For you—the ROTOBLAST method offers equally important advantages. Investigate ROTOBLAST—barrels, tables, special machines. Write Pangborn—*world's largest manufacturer of blast cleaning and dust control equipment*. Pangborn Corporation, 1298 Pangborn Boulevard, Hagerstown, Maryland.

*Trademark of the Pangborn Corporation

Pangborn ROTOBLAST Cleaning Barrel shown at shake-out end of mechanized molding loop.

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

BLAST CLEANS CHEAPER WITH THE RIGHT EQUIPMENT FOR EVERY JOB

ONE WALLOP makes a BETTER Body for this container . . . At LOWER Cost

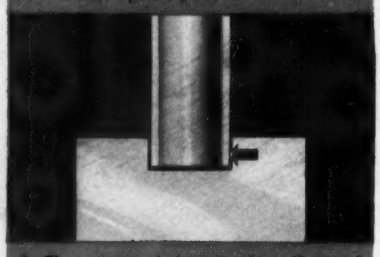
In the flick of an eyelash, a slug of Alcoa Aluminum is impact-extruded . . . walloped once . . . to form the cylindrical body of this container . . . complete with formed ribs and bottom stud ready for threading.

The impact extrusion process is ideal for the low-cost production of symmetrical parts that would require several forming operations if made by ordinary stamping, spinning, or drawing methods. And you have much greater leeway in special design features when you make it an impact extrusion. ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Penna. Sales offices in leading cities.

HOW THEY'RE MADE—

1. A slug of aluminum is struck one sharp blow in a die by a punch.

2. Because the die is larger than the punch, the metal flows out of the die and shoots up the punch.



3. The space between the die and punch determines wall thickness. The external design features are incorporated in the die, the internal in the punch.

MORE people want MORE aluminum for MORE uses than ever

ALCOA FIRST IN ALUMINUM

IN EVERY COMMERCIAL FORM

"EASY DOES IT"
THAT'S THE PULL OF THIS LOCOMOTIVE

Slowly, smoothly, easily the string of cars hauled by a Whitcomb Diesel Electric starts toward its destination. Diesel power as applied by Whitcomb locomotives flows without interruption and has proven to be the most constant, most reliable and by far the most economical power application in the locomotive field today.

Near 100% availability, excellent visibility, easy accessibility for quick servicing and maintenance, together with experienced designing, engineering, and expert workmanship—all add up to the indisputable conclusion that Whitcomb Diesel electric locomotives meet all the requirements of modern switching and intra plant hauling.

And the savings made possible by low operating and maintenance costs will provide satisfactory over-head figures for years to come—if you specify Whitcomb.

Other Whitcomb models—Diesel electric and Diesel mechanical from 3 to 80 tons are described and illustrated in the new bulletin, just off the press—write for a set.

BLW THE BALDWIN GROUP

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILL.

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

Here's everything you want to know about P&H Hevi-Lifts . . . applications, pictures, specifications. It's Bulletin H5-1 — yours for the asking.

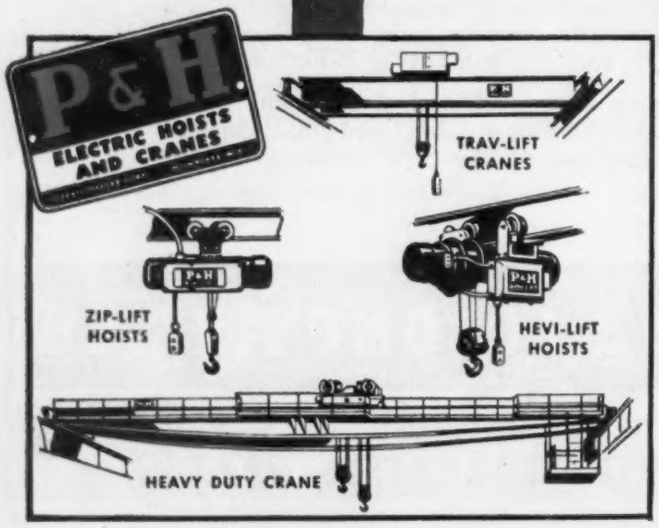
YOU DON'T PAY FOR REHANDLING

when you move loads "THRU-THE-AIR!"

That's where you make the big saving! From the time your loads are picked up, until they're "spotted" into place, you have no rehandling at all. No "muscling" before and after . . . your P&H Hevi-Lift Hoist does *all* the work, quickly, effortlessly.

- Think of the time and energy saved!

Skilled hands are never kept waiting, never tired by needless work — push buttons do it all! The P&H Hevi-Lift, with capacities up to 15 tons, brings every advantage of "thru-the-air" handling to all types of plants. For advice on your specific needs, consult a P&H Hoist Engineer . . . or see bulletin at left.



The "Extras" Are STANDARD EQUIPMENT, Added Values on P&H Hevi-Lift Hoists

- Shaved gears for lifetime service . . . all bearings grease-sealed.
- Thermal overload protection against motor burn-outs . . . twin brakes for extra safety.
- Motors specifically designed and built by P&H for hoist service — high starting torque, frequent reversals, etc.
- Effortless push-button control . . . available for all motions and with variable speed feature.
- Transformer provides 110 volts at push-button.
- P&H's true motor ratings assure against failure at full capacity loads and speeds.

P&H ELECTRIC HOISTS
4411 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION
HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

YOU *Save* BY STANDARDIZING

on Airco Nos. 87, 90 and 230 Electrodes

(A.W.S. Class. E6011-12-13)

Here are three A.C.-D.C. electrodes that meet approximately 61% of all general-purpose, mild steel welding requirements — on production lines, or special jobs.

Airco No. 87, 90 and 230 produce weld metals of high mechanical properties. Their excellent slag coverage results in an unusually smooth deposit, with easy slag removal. Airco No. 230, for example, has a specially formulated coating that produces a spraying type of arc. This is of great assistance in the performance of vertical and overhead welding, permitting high welding speeds with excellent deposits.

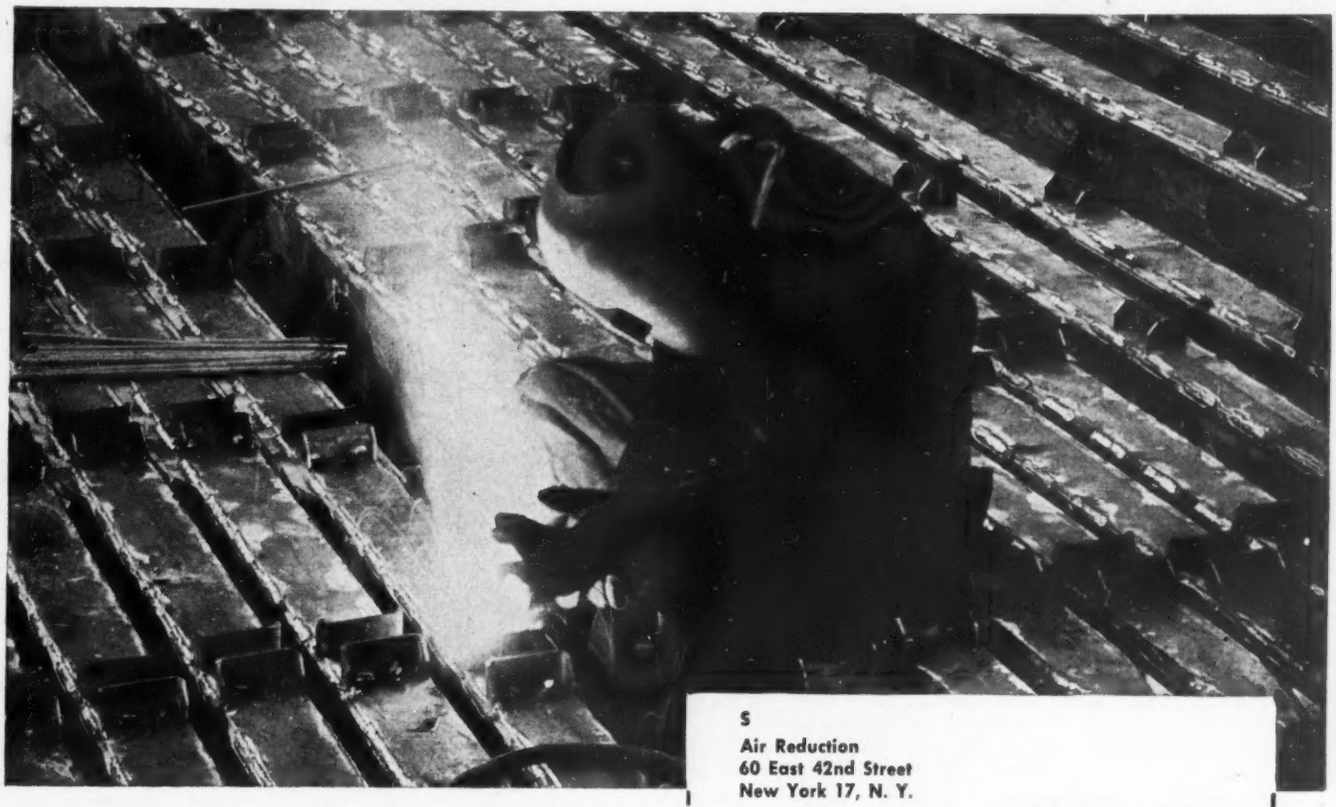
All three electrodes are recommended for normal or high speed welding in the flat, vertical or overhead position and are known for their:

- . . . Low Spatter Loss
- . . . Light, Easily Removed Slag
- . . . Unusual Smooth Weld Deposits
- . . . Excellent Operating Characteristics

But learn all about these general-purpose electrodes for yourself. Ask for Airco Electrode Catalog No. 120A. Just fill in and mail the coupon for your copy. Address: Air Reduction, General Offices, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., General Offices, Houston 1, Texas. Represented Internationally by Airco Export Corp.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities



Headquarters for Oxygen, Acetylene and other Gases . . . Carbide . . . Gas Welding and Cutting Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories.

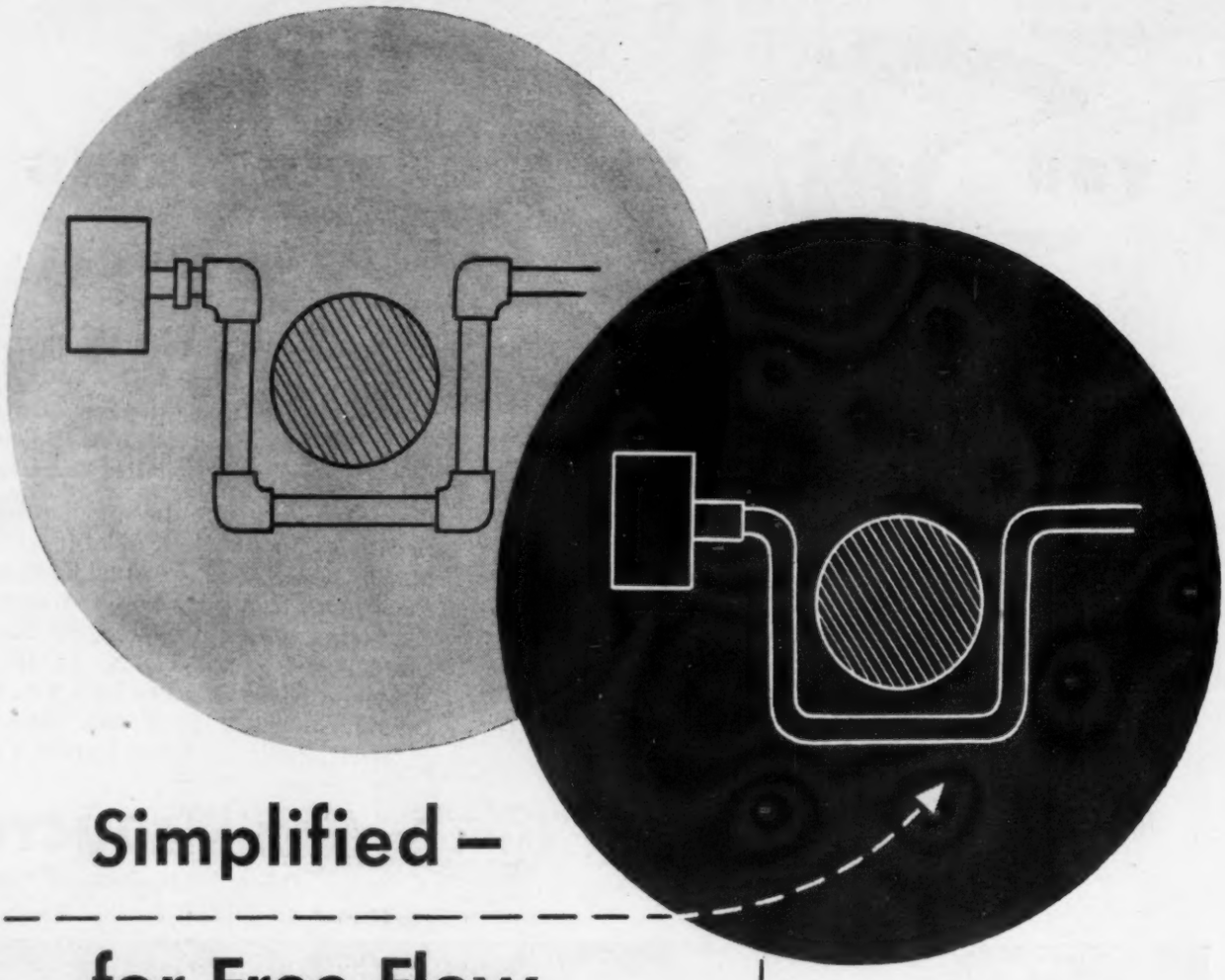
S
Air Reduction
60 East 42nd Street
New York 17, N. Y.
Please send me the Airco Electrode Catalog No. 120A.

Name.....

Firm.....

Address.....

City..... Zone..... State.....



Simplified—

for Free Flow

Easy to bend, tubing goes wherever you want it—around corners—into tight places . . . with *fewer fittings*—fewer chances for leakage. Assembly and maintenance are quicker—easier.

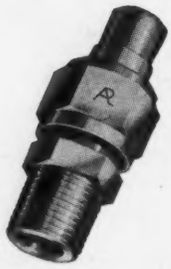
Tubing systems, engineered with PARKER Fittings and Valves, insure Free Flow, with fewer obstructions and less turbulence. They take less space—and weigh less.

If you have fluids to move—either liquids or gases . . . under high or low pressure—you can do it better using tubing with PARKER Fittings and Valves. Available from conveniently located warehouses and distributors.

Let's talk it over.

THE PARKER APPLIANCE COMPANY
17325 Euclid Avenue • Cleveland 12, Ohio
Offices: New York, Chicago, Los Angeles, Dallas, Atlanta
Distributors in Principal Cities

Parker
TUBE FITTINGS • VALVES



THIS PARKER TUBE FITTING MAKES FREE-FLOW SYSTEMS POSSIBLE

With this Tube Fitting—as with all PARKER Fittings and Valves—pressure-tight and leakproof connections are assured.

Threading is all on the fitting—you can use heavy or light *bendable* tubing—steel, stainless, light metal or brass.

All PARKER Fittings are *precision-made*—easy to install or remove, and every PARKER Fitting is a *coupling*.

Write for Bulletin A-48, reviewing PARKER Products.

WEIRTON

COLD-ROLLED SHEETS

SOUND FOUNDATION OR SOUND VALUES

For those values that are more than skin-deep—the values that underlie the exterior finish of a manufactured product—there can be no better foundation than Weirton cold-rolled low-carbon steel. Because of uniformly good quality and finish, Weirton sheets are highly esteemed by manufacturers who seek to attain sound value in their products.

WEIRTON STEEL CO.

WEIRTON, W. VA. *Sales Offices in Principal Cities*

Division of NATIONAL STEEL CORP. *Executive Offices, Pittsburgh, Pa.*

WEIRTON STEEL COMPANY

NATIONAL STEEL

Sleeve Bearings
TO FIT THE JOB!

We design and manufacture a wide range of types and sizes of *silent* sleeve bearings and bushings, plain and flanged, full round and split, as well as a great variety of precision bronze parts. Our engineering department can aid in preparing specifications that fit both performance and cost requirements. Each of our manufacturing plants specializes in bearing manufacture within a specific range of size, volume and alloy combinations, resulting in facilities for both large volume production and small runs. Thrust washers and precision bronze parts—and large bearings up to 27" diameter are a specialty.

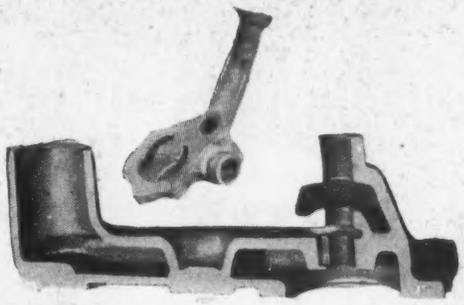
FEDERAL-MOGUL CORPORATION, 11051 Shoemaker, Detroit 13, Mich.

FEDERAL-MOGUL

Silent FEDERAL Mogul SLEEVE BEARINGS

To remove scale from parts like this...

Machined, forged, or cast of any metal or alloy which does not react with molten caustic and whose physical characteristics are not adversely affected at 700° F.

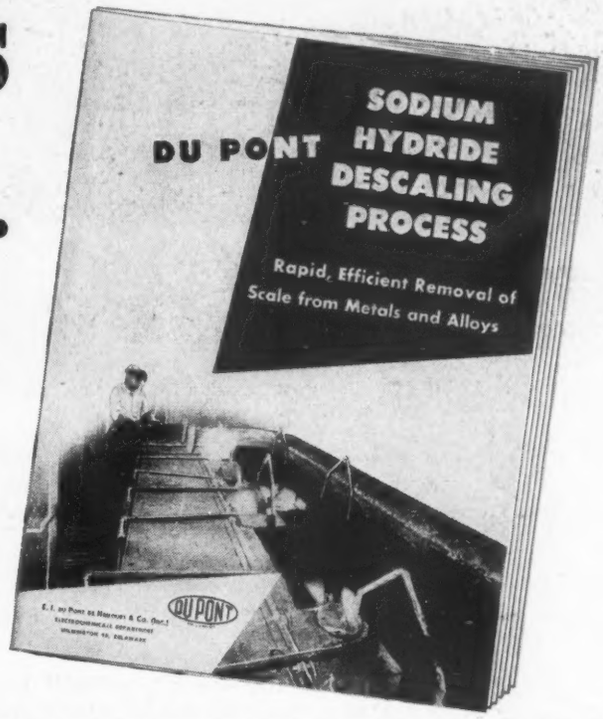


The efficient new method is this...

It's the Du Pont Sodium Hydride Descaling Process . . . that positively removes all scale quickly with no pitting, no pickling losses . . . that makes timing in the bath a simple matter...that can mean to you, in brief, important savings in time and money.

This booklet tells the whole story...

It gives the many advantages of the process. Shows how they help *you*. Tells exactly what Sodium Hydride Descaling is, how it works and where it is used, along with interesting photographs, diagrams and technical information, designed to help you get the most out of your scale removal jobs. Send for it today! Clip the coupon and mail it to E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Delaware.



DU PONT

Sodium hydride process for positive descaling

BETTER THINGS FOR BETTER LIVING
. . . *THROUGH CHEMISTRY*

DU PONT
REG. U. S. PAT. OFF.

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department
Wilmington 98, Delaware

Please send my copy of "Du Pont Sodium Hydride Descaling Process."

Name_____ Position_____

Firm_____

Address_____

SPECIFICATIONS ALONE DO NOT MAKE A WORM GEAR

Controlled Atmosphere Hardening
INCREASES *Life of* **DE LAVAL** *Gears*

The extremely long life of De Laval Worm and Gear sets is due, in part, to the heat treatment to which the worms are subjected. Made from carefully selected alloy steel, De Laval worms are case hardened in the most modern, controlled atmosphere, forced convection, electric furnaces under careful metallurgical inspection and control. The heat treatment process employed provides a hard, uniform case and correct core structure of high tensile strength, free from internal stresses.

WG-2

TURBINES · HELICAL GEARS · WORM GEAR SPEED REDUCERS · CENTRIFUGAL PUMPS · CENTRIFUGAL BLOWERS AND COMPRESSORS · IMO OIL PUMPS

DE LAVAL

STEAM TURBINE COMPANY
TRENTON 2, NEW JERSEY

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Twenty-eight Dravo Counterflo Heaters start their journey from Pittsburgh to the West Coast. They will soon furnish heat for a new, modern automobile assembly plant in Southern California.

It is no longer necessary for buyers of industrial and commercial heating to take less than the best equipment in order to get prompt shipment.

For open space heating Dravo Counterflo Direct-Fired Heaters are undisputed leaders in quality, efficiency and performance. This is proved through thousands of successful installations.

Now — due to greatly expanded production facilities —
Dravo Heaters are Available Immediately!

If you have a heating problem involving 400,000 Btu or more, look up the Dravo distributor in the "Heater Section" of your classified telephone directory —or write or call Heating Section, Dravo Corporation, 300 Penn Avenue, Pittsburgh 22, Pa.

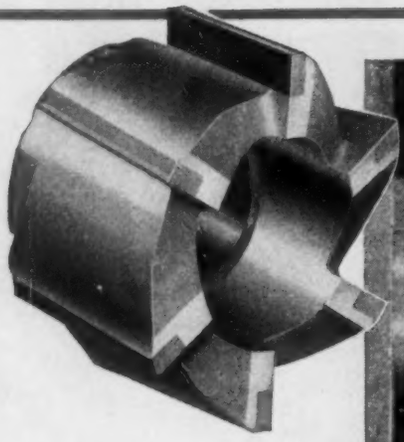
DRAVO CORPORATION

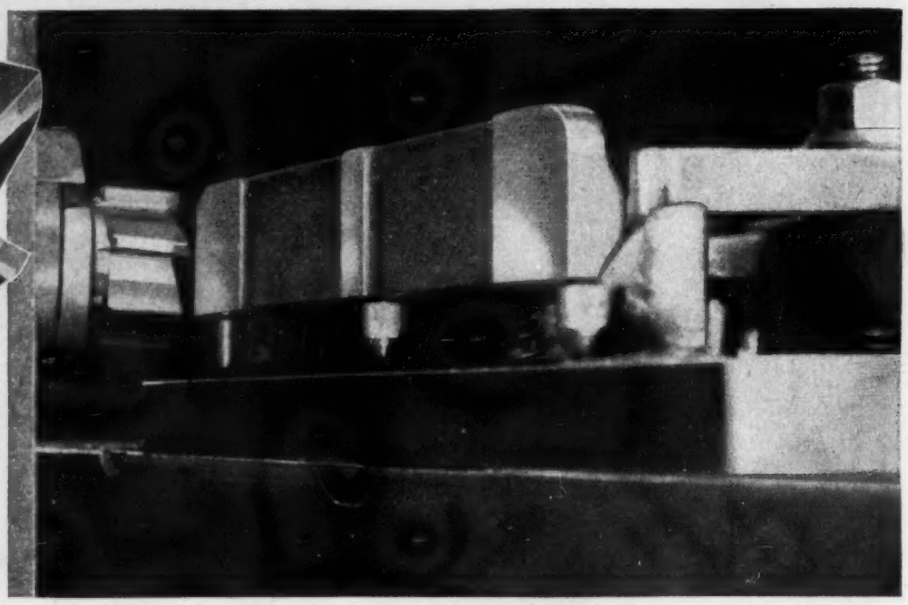
PITTSBURGH · PHILADELPHIA · CLEVELAND · NEW YORK · DETROIT
WASHINGTON · WILMINGTON

Bulletin BV-516 free on request.

WHEN YOU WANT MORE TOOL LIFE

Try B-C *Carbide Tipped Milling Cutters*





FROM 50 TO 200 PIECES MORE LIFE PER SHARPENING. B-C TIP MOUNTING REDUCES BREAKAGE CAUSED BY HARD SPOTS

TROUBLE SHOOTING? Tool Supervisors:— Production Superintendents:— If you are having difficulty smoothing out certain milling problems, get a copy of MILLING CUTTER DATA. Descriptions of actual field installations using B-C Milling Cutters will suggest feeds, speeds, tooling arrangements and efficient methods for a variety of cuts. A note on your company letterhead will bring a copy promptly.

CUTTER PERFORMANCE FACTS

Operation — Face mill 3 bosses removing ¼" stock, center boss 2" x 1", end bosses 2" x 2½".

Material — Medium cast-iron.

Cutters — B-C Carbide Tipped Shell End Mills, 2¼" x 1½" x 1¼", slight spiral gashes.

	HSS Cutter	C-T Cutter
Feed	3" to 4"/ min.	15"/ min.
Speed	40 S.F.M.	240 S.F.M.
Floor-to-floor	30-40 in 10 hrs.	90 in 10 hrs.
Tool Life	50 pcs. per sharpening.	200 pcs. per sharpening.

This job was slow and costly because of low tool life and high cutter breakage. Three intermittent bosses on cast-iron brackets required the removal of 1¼" stock. Hard spots and abrasive action of the material combined to shorten tool life by nicking and chipping the cutting edges.

After careful analysis of all factors, Barber-Colman Cutter Engineers recommended the use of carbide tipped shell end mills, with fewer teeth and slight-spiral gashes. Today, experience-tested B-C tip mountings and heat-treated high speed steel bodies are successfully withstanding the shock of the hard spots, and tool life and production are increased approximately 400%.

If your job conditions are suited to the use of carbides, consult a Barber-Colman representative on your next production problem. Experience the satisfaction that this manufacturer had in improving operation and increasing production.

MODERN MACHINES WITH ORDINARY BARBER B-C COLMAN CUTTING TOOLS ARE NOT FULLY EFFICIENT

Barber-Colman Company

GENERAL OFFICES AND PLANT 121 LOOMIS ST. ROCKFORD, ILLINOIS U.S.A.

HERE'S A WISSCO WIRE IN WHICH

Strength and Flexibility

ARE ESSENTIAL

For hoses that must resist crushing, kinking, suction or high pressure—wire reinforcement is essential. And, while such reinforcement adds strength, there must be no sacrifice of flexibility.

To insure the long life and wearing quality of their hose, The United States Rubber Co. have established exacting and rigid specifications. The Wissco Hose Reinforcing Wire used by them, has the high tensile strength to resist high pressure and is sufficiently ductile to permit easy forming.

The ability to meet exacting specifications is a tradition with Wickwire Spencer—and has been for over 125 years. Whether you need a soft, ductile wire for severe forming, or a strong, tough, hard drawn or tempered wire, we can meet your needs. We supply high or low carbon steel specialty wire; round, flat or shaped; in a wide variety of sizes, tempers, grades and finishes. Send your order or inquiry to Wickwire Spencer.

WISSCO *Wire*

A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION · THE COLORADO FUEL AND IRON CORPORATION

General Sales Office—361 Delaware Ave., Buffalo 2, N. Y. Sales Offices—Boston · Chicago · Denver · New York

PACIFIC COAST—The California Wire Cloth Corporation, Oakland 6, Cal.

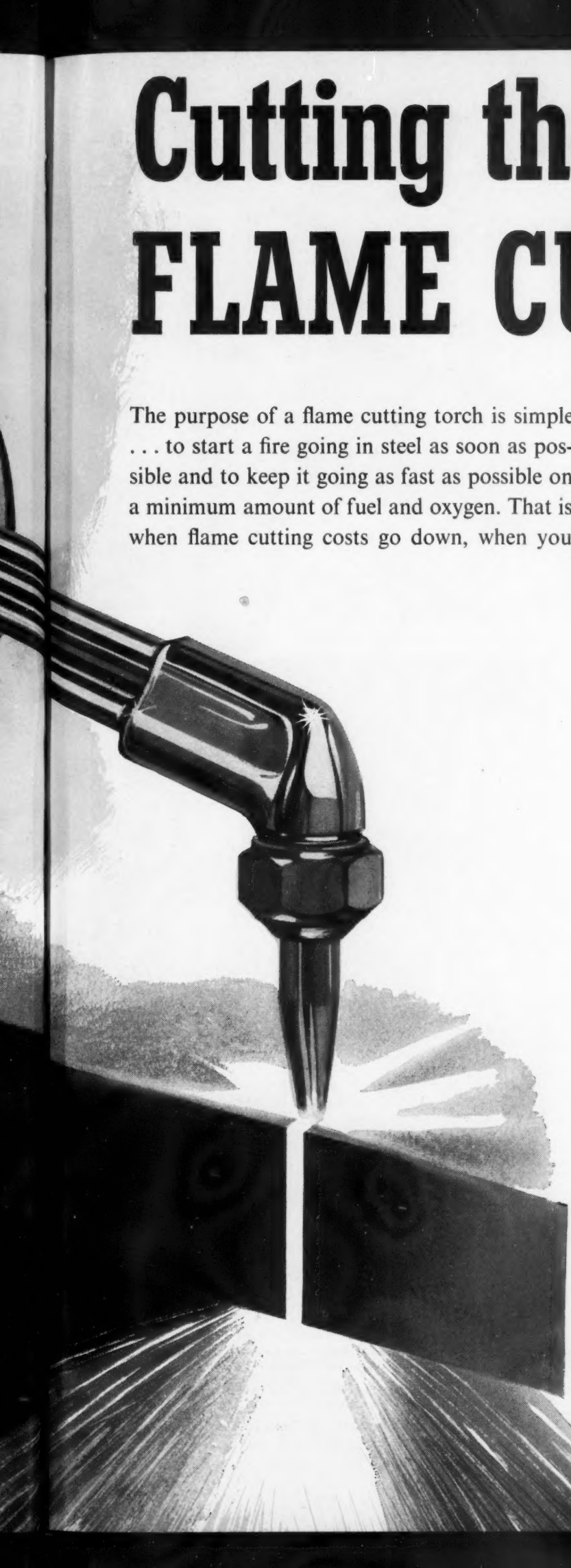
CF&I

NCG is recognized as one of the largest organizations of its kind in the world. It operates 73 manufacturing plants within the United States, offers supply from more than 700 warehouse stocks and service by a vast network of hundreds of independent NCG distributors. For assured satisfaction in *your* welding and cutting needs. . . .

RELY ON NCG

Cutting the Cost of FLAME CUTTING

The purpose of a flame cutting torch is simple . . . to start a fire going in steel as soon as possible and to keep it going as fast as possible on a minimum amount of fuel and oxygen. That is when flame cutting costs go down, when you use Rego KX Cutting Torches.



You don't have to wait until cost and production figures are in to know the economy and speed of Rego KX. You get evidence of cutting efficiency and the correctness of KX tip design in the non-turbulent oxygen stream . . . in the clean narrow kerf with sharp edges. You see it in the ratio of preheat output to oxygen jet that results in faster preheating and sustained oxidation.

You see more direct evidence of the fundamental correctness of KX design in the way the working parts withstand high temperatures without distortion or leakage . . . in easy and rapid tip change and torch adjustments.

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These Hard-Faced Mixer Blades Are Still in Service

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This cast-steel mixer blade was hard-faced with HAYNES STELLITE No. 6 welding rod. Protected areas include the leading edge of the 26-in. blade and the stuffing box bearing, 6 in. in diameter.

These hard-faced cast-steel blades—used to mix an unusually abrasive rubber compound—are still out-to-size and in good operating condition after more than 5 years of service.

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A view of the two mixer blades as installed in the 100-gal. mixing tank. After 5 years these blades are still out-to-size and in good working conditions. Unfaced blades lasted about 8 months.

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Unit of Union Carbide and Carbon Corporation

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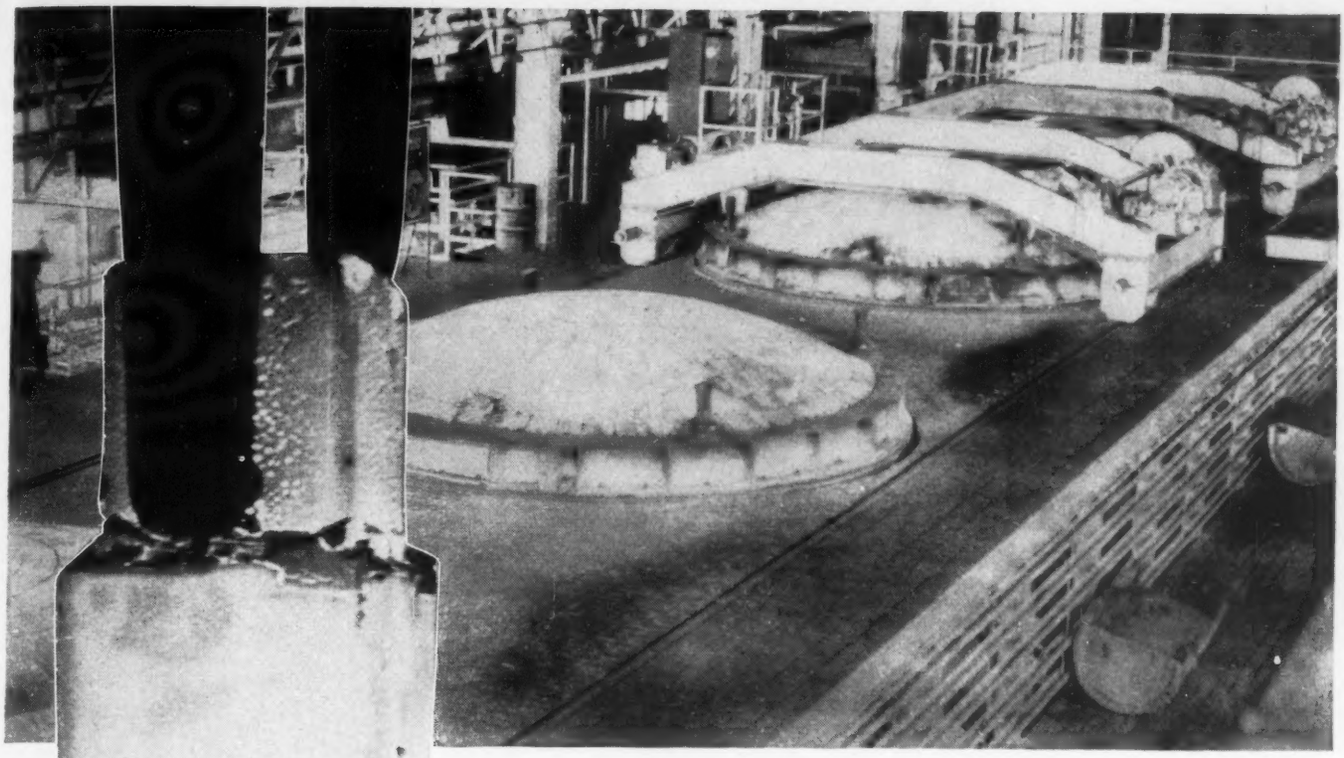
The mixer shown is patented by Baker Perkins, Inc. (No. 1,801,025).



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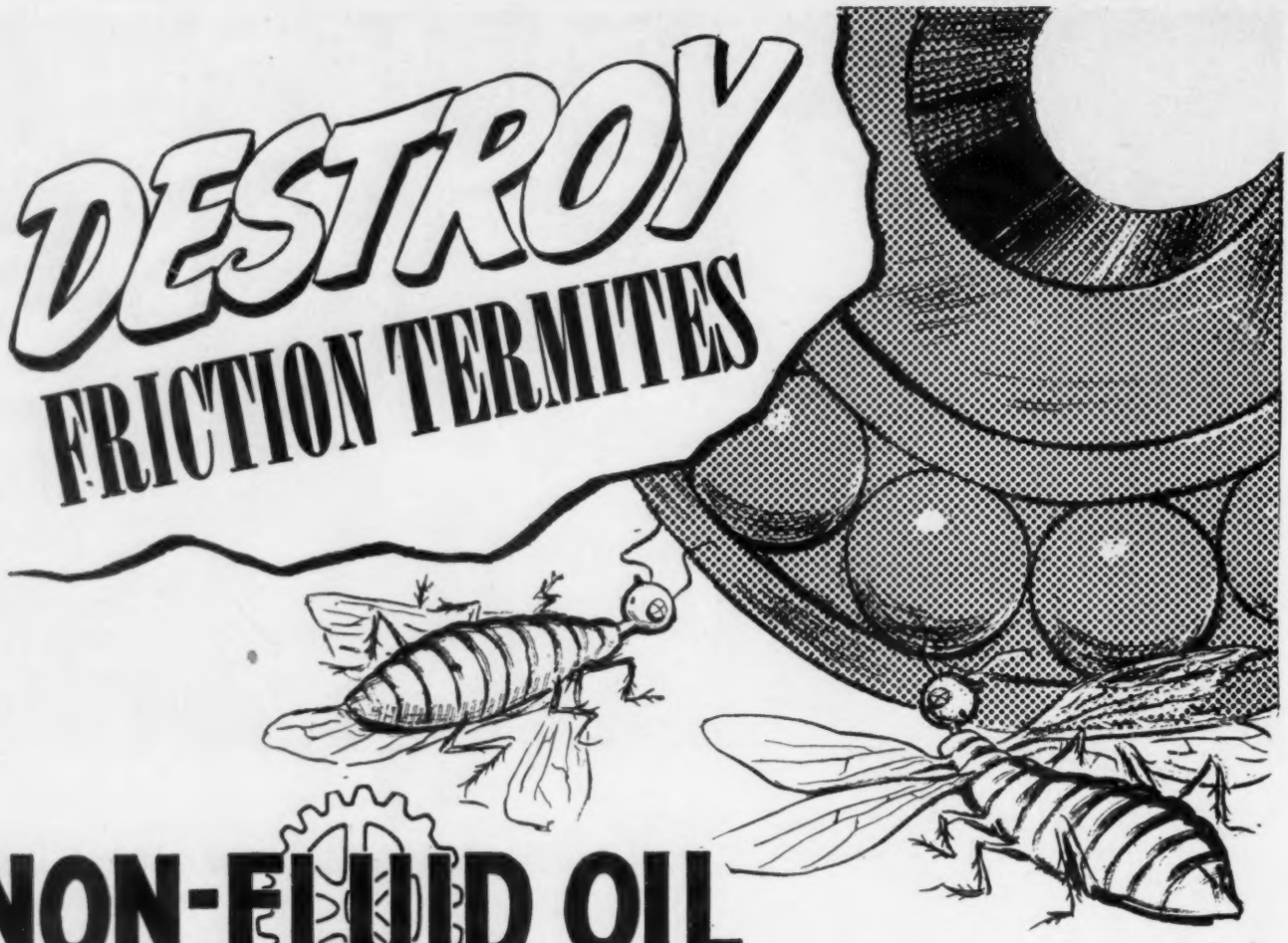

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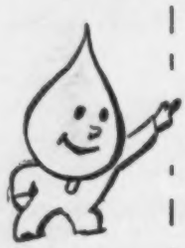

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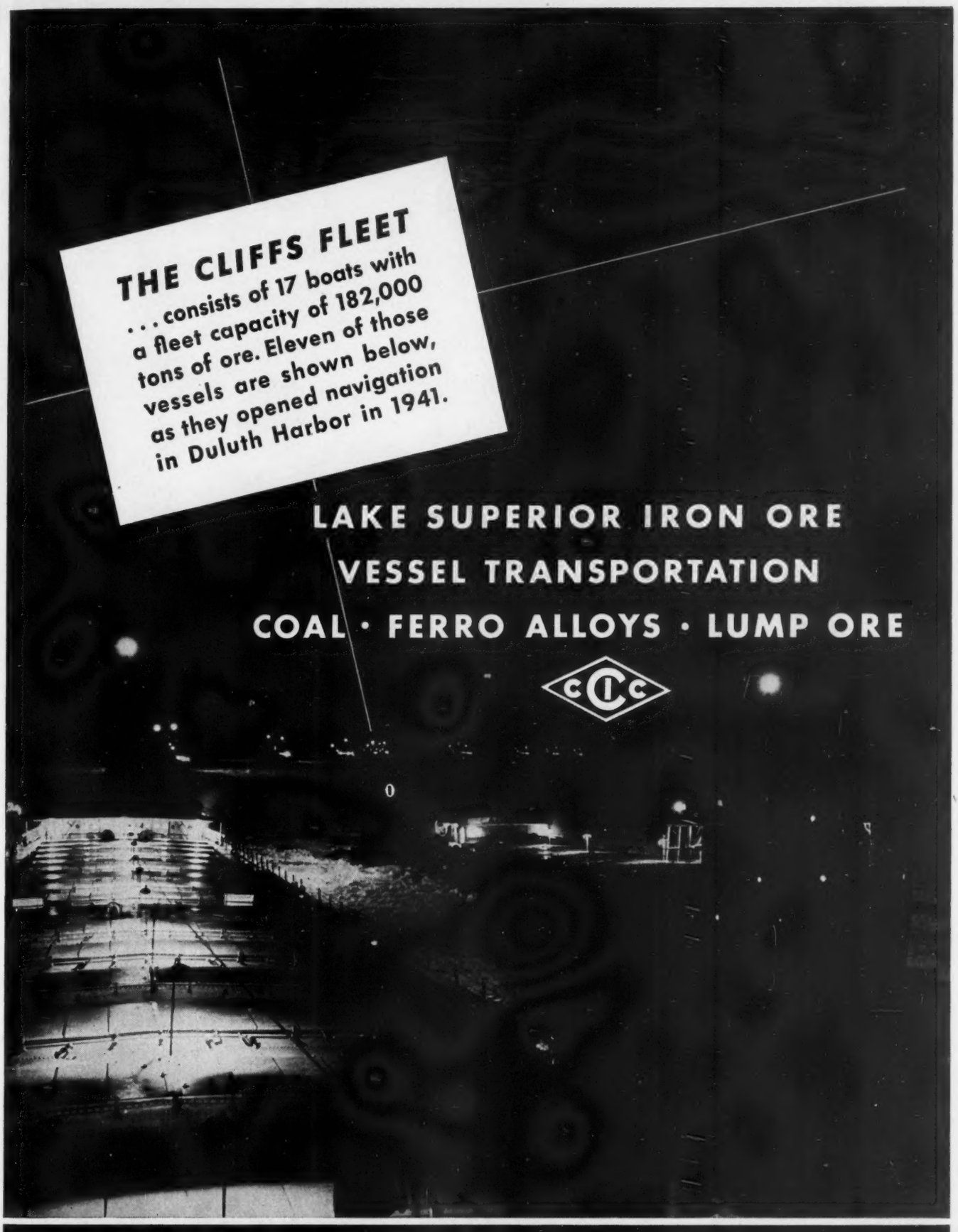
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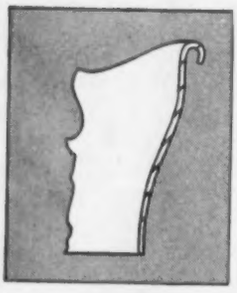
Ingenious Tool Designing Solves Intricate Stamping Problem



The fact that this Thayer Toddler* seat back is form-fitting (see sketch) and has a large rolled edge all the way around presented many problems in tool design.

After blanking, piercing and forming ends, one problem was to form the reverse bend in the back, the large U shape, and roll the top edge in *one* press operation. The problem was finally solved by designing a tool which applied pressure in two directions. The horizontal force holds the partially preformed part securely in a large forming die while the vertical force (downward stroke of the press) curls the entire top edge in one operation. This combination of operations also sets the final shape of the whole seat back.

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32A

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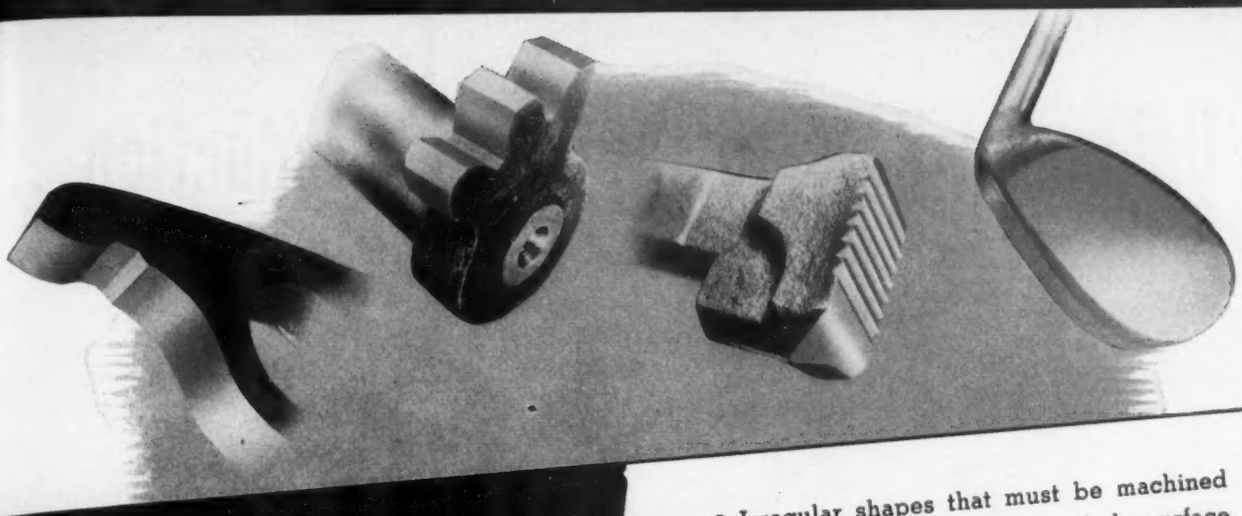

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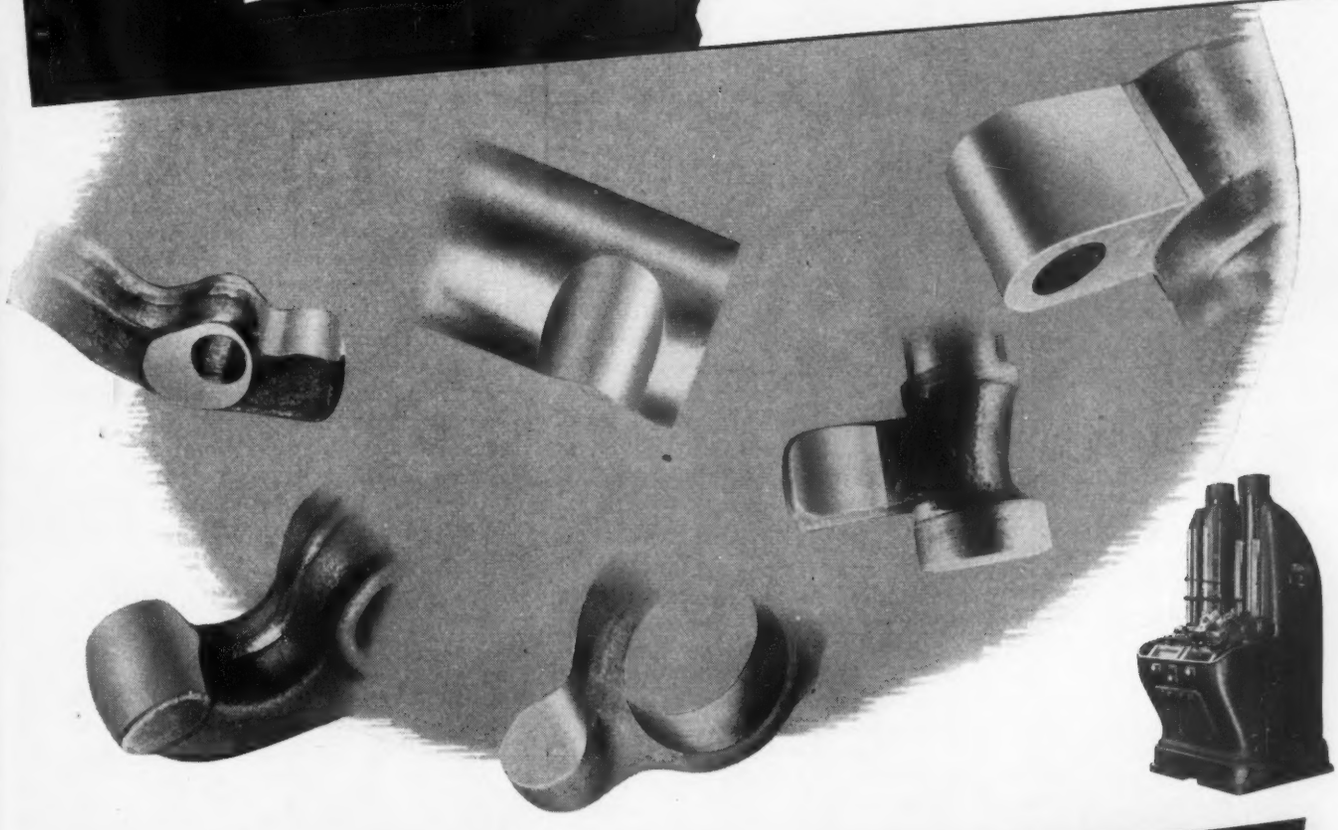

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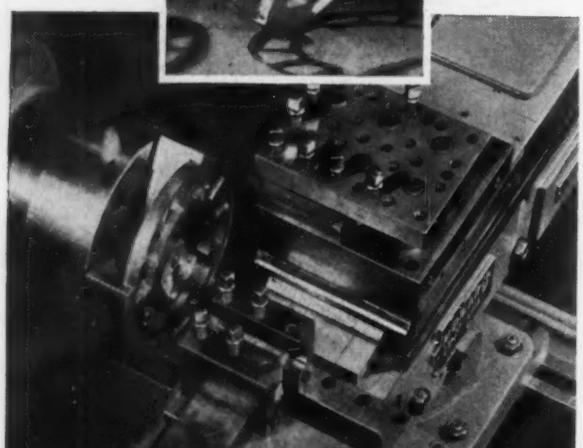

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Periodic Reverse Current Plating
Mercury Arc Rectifier Applications
Forming Magnesium Alloys

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 120, NO. 16 APRIL 21, 1947

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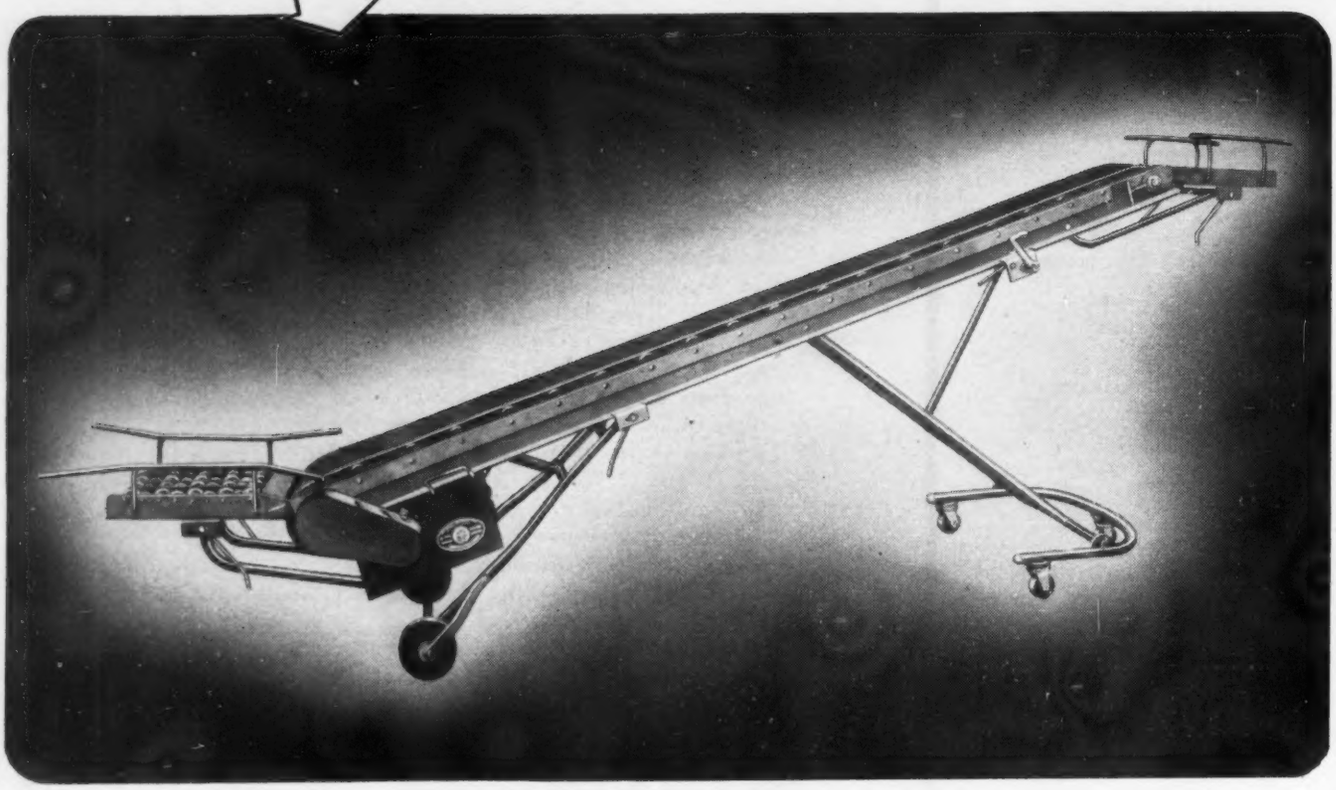

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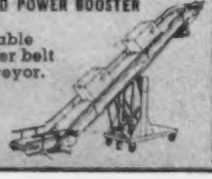

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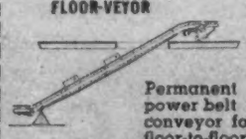

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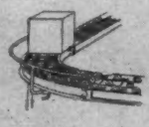

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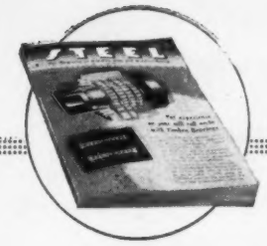


April 21, 1947

Everyone's Problem

In exchange for a modest taxi fare and tip, this writer recently received from the driver not only welcome transportation on a rainy night but also this reply to the question, "How is business?":

"Not so good. Families have to spend $7 to $8 more per week for food and this means they spend that much less for other things, including taxi fares. Other price increases are worrying people. For instance, 16 months ago I ordered a car, thinking it would cost about $1600. Last week the dealer said my car was ready, but it would cost $1900. I talked it over with my wife and after a lot of figuring we decided not to take the car, even though we had the cash to buy it. I guess we're like most other people. Rather than live beyond our means, we'll go without some things until prices come down. That's why the taxi business isn't as good as it was."

Ordinarily one does not expect economic wisdom from taxi drivers, but in this instance the man at the wheel was stating in simple, realistic language precisely the same problem that engaged the attention of President Truman, members of his cabinet and his economic advisers at the memorable cabinet meeting on Apr. 9.

From reports of that meeting it is evident that in the main the facts and opinions presented by the economic advisers were sound. The gist of their argument was that rising prices are forcing buyers out of the market and that unless the price trend can be reversed soon, the nation will undergo a recession.

Following the session, President Truman told newsmen the responsibility for price reduction rests squarely with businessmen. This is only partly true. Food prices are disproportionately higher than those of manufactured products and government policies are chiefly responsible. The President would have been more nearly right if he had said the responsibility for lowering prices rests with government, farmers, labor, businessmen and others whose actions influence prices.

Seldom has the need for united action been so clearly apparent to so many persons as in the case of prices today. This being true, it would seem that ordinary common sense should be sufficient to induce us to co-operate in doing the things that are so obviously necessary if the trend of prices is to be reversed. If we haven't the common sense or the willingness to co-operate, then we will deserve the depression that will ensue.

° ° °

CURE FOR MERGERITIS: Federal Trade Commission has completed a study showing that since 1940 more than 1800 formerly independent companies in manufacturing and mining industries have disappeared as a result of mergers and consolidations. It presents this information as an argument in favor of a Congressional amendment to the antitrust laws to give the commission more authority in ruling upon mergers.

Before jumping to conclusions on this proposal, it may be well to ask what has been the motivating incentive for mergers during the past few years. The answer is that government policies have been the chief factor. Intricate bureaucratic controls made it extremely difficult for the small companies to keep up with the confusion of Washington directives. The antics of OPA and CPA induced many small operators to sell out to larger corporations in order to get under the umbrella of an organization large enough to shed the oppression of Washington red tape. More recently the seeming necessity of insuring a reliable source of supply for hard-to-get materials has been a major factor in mergers.

The most effective cure for mergeritis is not in-

(OVER)

creased governmental authority. On the contrary, it is the elimination of factors which cause small companies to sell out to large ones. Make corporate existence more endurable for the efficient small operator and the merger problem will take care of itself. —pp. 61, 70

• • •

STEEL NET UP IN 1946: Analysis by this publication of the detailed financial reports of 25 steel companies shows that in 1946 these companies earned an aggregate net income of $246,718,641 on net sales of $4,491,529,424, or 5.53 cents on each sales dollar. This compares with a net income of $172,281,467 on net sales of $5,557,013,329, or 3.06 cents on the sales dollar in 1945.

This improvement in earning power, which interrupts a downward trend in earnings that had continued for four years, was made possible by a number of unusual circumstances. Among them were lower federal tax rates, reduced operating costs and the use of substantial sums from contingency funds to offset the cost of strikes and other abnormal expenses.

Improved earnings coupled with a moderate reduction in preferred dividend requirements permitted average earnings per share of common stock to rise from $3.62 in 1945 to $5.08 in 1946. Aggregate funded debt increased 12.7 per cent in 1946 and the current ratio declined to 3.22 to 1.

—Insert following p. 66

• • •

SAFETY IDEA CLICKS: In a National Tube Co. plant employing 7000 workers daily exposed to potential injury hazards that are common to the operation of blast furnaces, open hearths, rolling mills and finishing equipment the lost-time accident average frequency since 1937 has been about half of that in the years preceding 1937. Major credit for this remarkable achievement is given to the company's "safety captain" program.

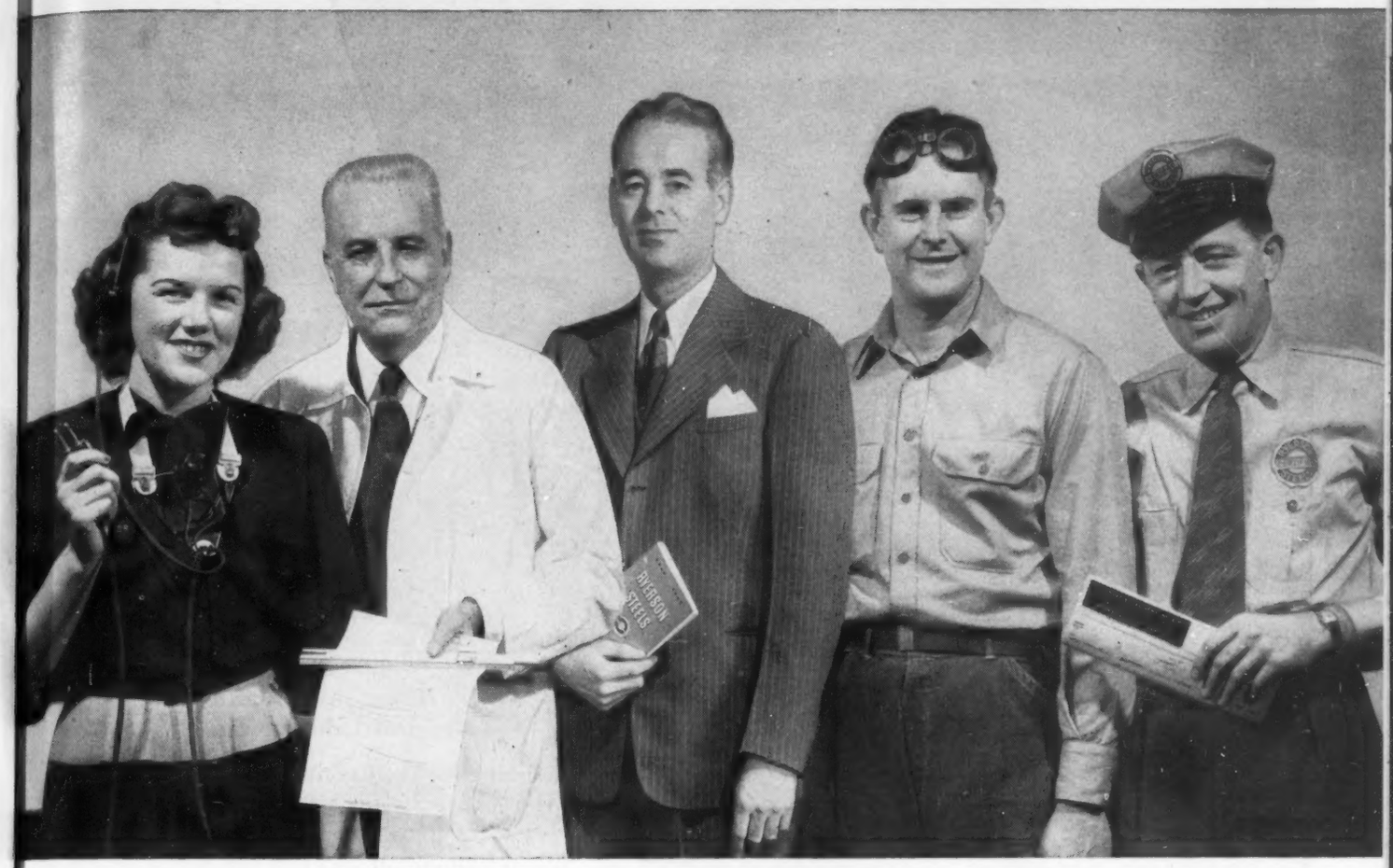
A safety captain is an employee selected by a supervisor to assist him in correcting unsafe practices. Each safety captain acts as a safety inspector for 30 to 40 employees. He holds office for three months. About 180 safety captains are appointed each quarter. This means that in a year's time 720 key men are giving their moral support to shop safety.

Any program that cuts the accident rate in half deserves careful consideration. Many employers will find it profitable to investigate the "safety captain" idea. —p. 106

SIGNS OF THE TIMES: Lincoln Division of Ford Motor Co. late this month will inaugurate a suggestion system whereby employees will receive cash awards for acceptable ideas leading to betterment of product, advancement of operations, improvement of working conditions or perfection of safety devices. Employees submitting worthy suggestions (p. 74) will be awarded 100 per cent of the savings accruing to the company during the first two months the suggested plan is operative. There is no top limit on the amount of award. . . . Projected pipelines for natural gas will require 2,500,000 tons of steel. The two companies making pipe in 24 to 26 in. diameter sizes have capacity for fabricating about one million tons annually. However, they are not operating up to this capacity at the present time (p. 60) because of the scarcity of steel plates. . . . Chargeoffs for depreciation and obsolescence are coming in for another round of critical attention. An Ohio builder of heavy equipment (p. 90) makes a strong point by citing the hypothetical case of a seven-year old machine costing $50,000 originally on which depreciation has been taken on a 20-year basis. Many comptrollers will say this machine today is worth $32,500, whereas it is possible that new methods or new designs have introduced a factor of obsolescence that reduces that $32,500 to the scrap value of the machine. . . . Use of miniature models to facilitate planning of plant layouts seems to be gaining popularity in motordom. Most recent illustration of this trend is the ¼-in. to-the-foot replica (p. 104) of the interior of the plant of Dodge Truck Division of Chrysler Corp. at Detroit. . . . Robert W. Wolcott, president of Lukens Steel Co., heads a new joint committee of American Iron & Steel Institute, Institute of Scrap Iron & Steel, Steel Founders Society of America, Gray Iron Founders Society, Inc. and Malleable Founders Society (p. 62) to work for the release of "millions of tons" of government-held iron and steel scrap in the form of surplus military and industrial equipment in the United States and in war zones, of damaged and obsolete Navy and Maritime vessels and of war-damaged and wornout equipment in occupied Germany and the Pacific islands. . . . Mecca for foundrymen from Apr. 28 through May 1 will be Detroit (p. 64) where papers reflecting recent developments in foundry practice will be presented at the 51st annual convention of the American Foundrymen's Association.

E. L. Shaner

EDITOR-IN-CHIEF



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In these days of critical shortages, some firms seem to consider it a favor to provide a needed product. But here at Ryerson you'll find no seller's market complex. Every inquiry is still regarded as an opportunity to serve and every order a compliment to our organization.

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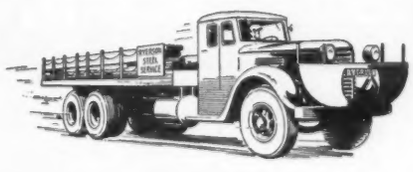
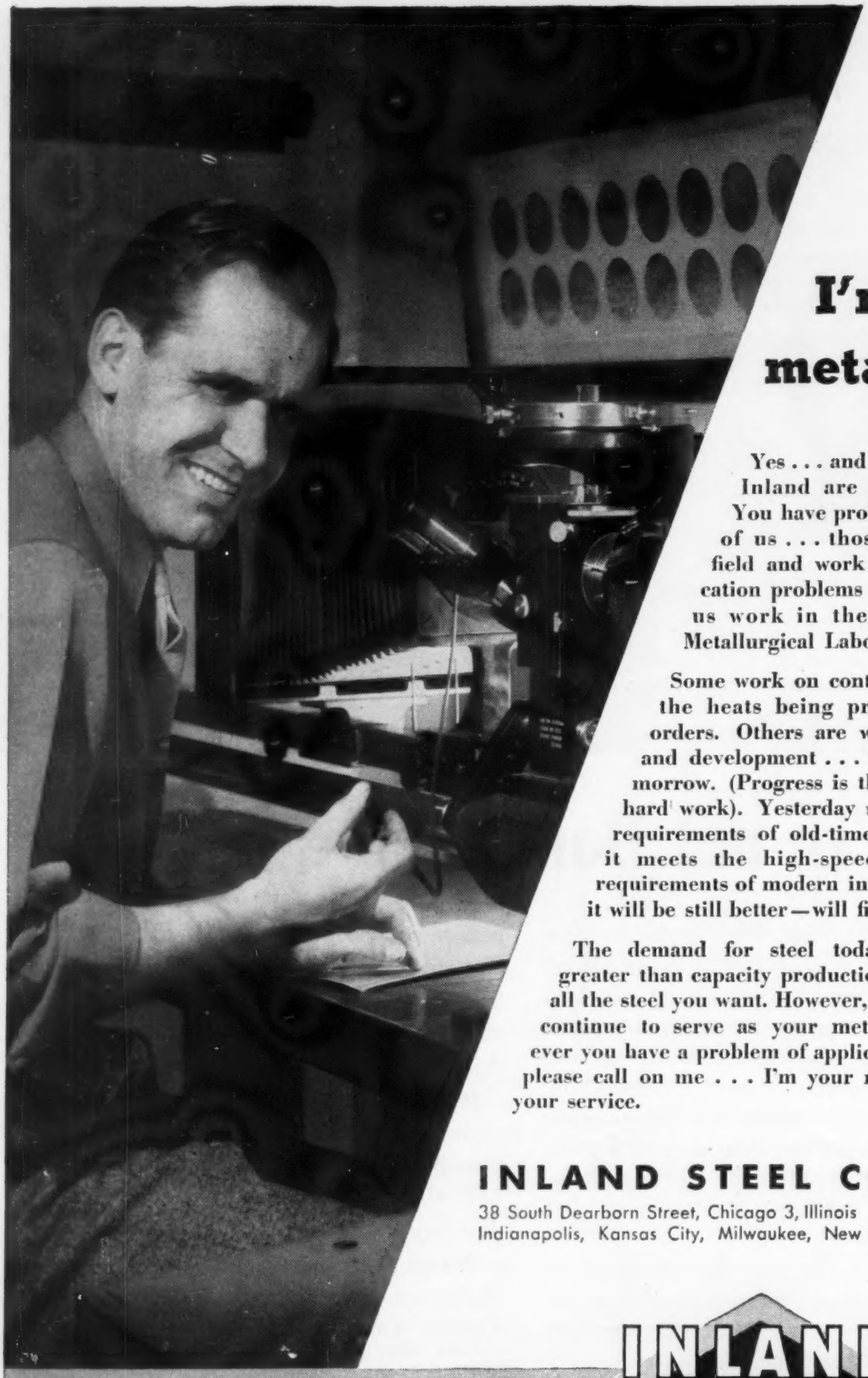
So contact your nearest Ryerson plant for prompt, personal service. We may not always have all the steel you need but we'll certainly do everything possible to take care of you.

Joseph T. Ryerson & Son, Inc. Steel-Service Plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.



RYERSON STEEL



I'm your metallurgist

Yes . . . and almost 200 more at Inland are your metallurgists. You have probably only met a few of us . . . those who go into the field and work directly with application problems on the job. Most of us work in the Inland Mills and Metallurgical Laboratories.

Some work on control of the quality of the heats being produced for today's orders. Others are working on research and development . . . for the steels of tomorrow. (Progress is the reward of applied hard work). Yesterday steel met the simple requirements of old-time methods . . . today it meets the high-speed, mass-production requirements of modern industry . . . tomorrow it will be still better—will fill new needs.

The demand for steel today, unfortunately, is greater than capacity production so you cannot get all the steel you want. However, Inland metallurgists continue to serve as your metallurgists. So, whenever you have a problem of application or fabrication, please call on me . . . I'm your metallurgist—and at your service.

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Help overcome the Steel Shortage—Keep your scrap moving back to the mills.

PRINCIPAL PRODUCTS: BARS • STRUCTURALS • PLATES • SHEETS • STRIP • TIN PLATE
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Great Lakes iron ore shipping season is gaining momentum with the first cargoes already unloaded at lower lake docks. Given freedom from strikes, the steel industry will require nearly 80 million tons of ore to keep its furnaces in operation until the opening of the 1948 season. Above, the JOLIET of the Cleveland Cliffs Iron Co., arriving at Sault Ste. Marie to open the season. NEA photo

Await Break in Steel Wage Parley

Industry continues optimistic over prospects for peace as contract extension nears expiration. Economic issues now under discussion. General Motors agreement with electrical workers suggests pattern

WITH the steel wage contract extension rapidly running out, both industry and union leaders profess not to know what lies ahead in steel labor. Only ten days remain before the contract expires Apr. 30 and by late last week little progress had been made toward negotiating a new agreement.

In the outlook are three possibilities:

1. United States Steel Corp. and the United Steelworkers may rush through an agreement on wages and certain other demands of the union before the present pact expires.

2. A new extension of the present contract may be agreed upon to allow more time to negotiate on the union's demands and the corporation's counter demands.

3. Failing either of the above, the union may call a general steel strike early in May, though the possibility has been advanced only U. S. Steel plants may be struck, current contracts with other producers being temporarily extended.

Industry representatives generally continue optimistic over prospects of avoiding a steel shutdown, although they admit the labor situation has deteriorated within the past several months.

Union leaders have maintained strict silence on their plans in event a new agreement is not reached by Apr. 30. Over the past week-end Philip Murray was to meet with the union's executive board in Pittsburgh to discuss the negotiations. Today, the union's 160-member wage and policy committee was to convene in the steel capital and probably will decide what action will be taken by the union in event no agreement is reached before the Apr. 30 deadline. The steelworkers' union has set up the necessary machinery for calling a walkout by filing in January a 30-day strike notice under the Smith-Connally Act.

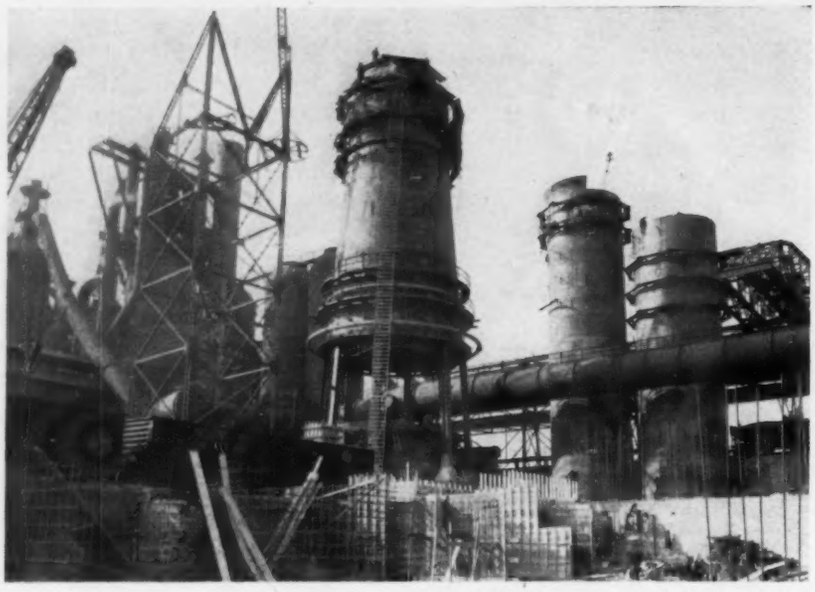
Negotiations between United States Steel and the union have been underway since January but up until a week ago had made virtually no progress on the critical issues of wages, union security, welfare funds and guaranteed annual wages. In fact, the first two and a half months of negotiations were given over to discussion of noneconomic issues. Last week, union leaders said that the economic issues finally were under discussion, although the union had not yet defined their wage demands any more specifically than to ask for a "substantial" increase.

Negotiations between other steel producers and the union also have been underway. These, however, have been stymied because both union and industry representatives want to know what agreement will be reached between U. S. Steel and the union before committing themselves on contract terms.

Despite the lack of developments in the steel wage negotiations, observers throughout the metalworking industry are speculating on whether the steel industry will have strike or peace. Factors pointing in both directions can be cited.

Chief among those auguring steel labor peace are:

1. Rank and file of the steelworkers do not want a strike. They believe that they were the losers in last year's stop-



NEW BLAST FURNACE: Three huge blast furnaces are under construction in Chicago by the Carnegie-Illinois Steel Corp. as part of the United States Steel Corp.'s postwar modernization and improvement program. When blast furnace No. 11, center, is completed next fall it will have annual capacity of more than 500,000 tons of iron

page. Although they gained an additional 3½ cents an hour as the result of the walkout, they lost nearly a month's wages. The entire increase which they won has been dissipated by price spiral which many of them believe was set off by the general 18½-cent wage increase granted organized industrial workers.

2. Emergence of a pattern for wage settlements for 1947. Tire manufacturers and the rubber workers' union have settled for an 11½-cent increase. General Motors and the electrical workers have agreed on an hourly increase of 11½ cents, plus six paid holidays. Consensus among industry observers is that eventually settlements in the steel, automobile, electrical and other hard goods industries may follow these lines.

3. CIO leaders do not want to bear the responsibility for strikes this year. They are keenly conscious of the resentment caused by last year's shutdowns. They have been walking and talking softly this year in an effort to minimize antiunion legislation by Congress. They are well aware of the unwillingness of most members to forfeit earnings during a strike.

On the other hand, unfavorable factors are:

1. The lack of progress in negotiations for a new steel wage contract. Union leaders may feel compelled to take drastic action unless they can report tangible results to members when the contract extension expires.

2. The declaration by President Truman that unless prices come down labor would be justified in pressing its demands for another round of wage increases. A similar declaration by Mr. Truman in the autumn of 1945 to the effect that labor should have substantial wage increases to maintain their wartime takehome pay, is generally credited with having given substance to the wage drive of early 1946. The Chief Executive's statement of Apr. 10 is expected to strengthen the union's wage demands.

Seldom of late has a White House statement aroused as much criticism as this statement by Mr. Truman. To some extent, the statement was attributed to the President's irritation over predictions of a recession later this year—a downward dip in the business curve which Washington observers already are calling the "Truman depression."

Generally the President is accused of playing unfair politics. Current high prices generally are attributed in large measure to White House influences: First, Presidential backing last year of demands for wage increases which have moved up manufacturing costs considerably; second, fear the White House would give a repeat performance.

Metalworking industry especially resented the President's statement for this industry currently is under the greatest wage pressure and by inference the price criticism was directed toward it.

Actually, metals and metal products prices have increased less than other major products, despite the fact they were among the first to assume the effects of higher wages.

Since 1941, prices of metals and metal products have advanced 39 per cent, compared with 108 per cent for farm products, 96 per cent for food, and 65 per cent for all commodities.

Comparative increases are shown in Bureau of Labor Statistics index figures (1926=100):

Commodity	1941	1947	Per Cent Increase
Metals and Metal Products	99.4	138.4	39
Foods	82.7	162.5	96
Farm Products	82.4	171.7	108
Hides and Leather Goods	108.3	175.8	62
Textile Products	84.8	135.4	59
Building Materials	103.2	172.6	67
All commodities	87.3	144.3	65

The usually easy-going Chamber of Commerce of the United States said it was "unfair" to hold business solely responsible for rising prices of recent months and pointed to the administration's assistance in encouraging inflation, as by discouraging price reductions for farm commodities and now by encouraging demands for new wage increases at a time when last year's increases have not yet been absorbed.

The Senate Labor Committee issued a study prepared by Gustav Peck, labor economist of the staff of legislative experts set up under the Congressional reorganization act, which refuted the claims of the proponents for increases in wages.

Peck's report pointed out that the record $12 billion corporate profits of 1946 were largely due to favorable changes in the tax laws—repeal of excess profits taxes, a slight reduction in rates, and to the "carry-back" provisions of the tax law.

The "carry-back" provision alone swelled corporate income by an amount somewhere between $3.5 and $4 billion. The report said that if this were missing in 1947, profits would return to normal levels or below.

The report said the CIO arguments advanced by Philip Murray and Robert Nathan, former government economist who prepared the wage arguments for the CIO, overlooked that fact that even in 1946 some corporations barely broke even and others lost money. Among the latter were listed automotive, electrical equipment and other major industries where the CIO is strongly entrenched.

The congressional report differed sharply with the CIO claim that corporations could apply $7.7 billion for additional wages in 1947 and still keep prices at present levels and profits well above prewar years.

"The course of prices in 1947 will depend principally on whether mounting supplies can overtake demand at present prices," the study contended.

Steelmakers in Canada Hope for Early Price Rise

Expectations follow announcement that controls had been lifted from many items, but not from basic iron and steel

CANADIAN steel interests continue to look for early advances in iron and steel prices, with definite action expected about the middle of May. These expectations came after announcement that the Dominion Wartime Prices & Trade Board had lifted price controls from many items, but not from basic iron and steel; scrap; primary, secondary and fabricated mill forms; cast iron soil pipe and fittings; nails; heating equipment and agricultural machinery.

Some steel producers in the meantime are accepting new orders with prices to be made known at time of shipment. Many steelmakers, however, are not encouraging new commitments as they are filled to the end of this quarter and hesitate to take orders for the third quarter because of the price and demand situations. Demand continues well in excess of supply.

Scrap Situation Is Bad

In addition to the problem of price, steel and foundrymen are faced with a shortage of scrap iron and steel. Scrap prices remain under ceiling control and have not been changed since early in 1942. Dealers point out that scrap prices are far out of line with other materials in Canada and are less than half the prices prevailing in the United States. The greater part of the scrap on farms is not being salvaged because the prices are no inducement. Dealers are depending largely on industrial scrap to meet consumer demand, but supply from this source is currently less than 10 per cent of requirements. Mills are gradually running out of scrap, while most foundries have been out of supplies for several months.

While there was a decline in iron and steel production in Canada during February, the loss was largely due to the shorter month. Steel output in February maintained a daily average of 82.4 per cent of rated capacity compared with 81.2 per cent in January, while pig iron held to an average of 70.8 per cent compared with 75.3 in January. In both iron and steel production for the first two months of this year there was a gain over the corresponding two-month period in 1946.

Output of ferroalloys in February totaled 9357 tons against 9655 in January and 10,872 tons in February, 1946, with production for the month including ferrosilicon, silicomanganese, ferromanganese, ferrochrome, and ferrophosphorus. Output for the first two months of this year showed a loss from the corresponding period of 1946.

January-February Steel Payrolls 80% Above 1946

Combined wages and salaries paid to employees of the iron and steel industry during January and February of 1947 were nearly 80 per cent greater than total payrolls in the first two months last year, according to figures of the American Iron & Steel Institute.

Payrolls for the first two months this year are estimated at $295,260,000 as compared with $169,890,500 paid during the comparable 1946 period. The national steel strike reduced those payrolls.

Total number of employees in the industry's iron and steel plants during February increased to 606,700 workers, of whom 517,500 were wage earners. In January, 1947, total employment was 601,200 workers, of whom 512,600 were wage earners.

These workers received $139,482,000 in wages and salaries during February, as compared with $155,778,000 in the 31-day month of January. Of these payments, wages represented $110,294,000 and $126,083,000 respectively.

During February average hourly earnings of the industry's hourly, piecework and tonnage workers declined slightly to $1.370 from the January record of $1.381. One reason for the dip was the smaller average number of hours per week worked by these employees in February as against January. Average hours worked by the industry's wage earners during February totaled 39.0, as compared with 40.3 in January.

Present, Past and Pending

■ PROCESSORS OF IRON, STEEL INCREASE 64.7%

NEW YORK—Number of establishments using iron and steel was 64.7 per cent greater in 1946 than in 1939. Approximately 33,600 establishments were processing iron and steel last year, against 20,400 in 1939. The increase was almost double the average rate of gain experienced by all types of manufacturing industries.

■ 350,000-HORSEPOWER JET ENGINES PREDICTED

DETROIT—Pilotless planes powered by ram jet engines developing the equivalent of 350,000 horsepower and capable of flying three times as fast as the speed of sound will be in the air in the not distant future, according to C. J. Reese, president, Continental Motors Corp. Continental is working with Army Air Forces in developing ram jet engines to operate guided missile types of aircraft at supersonic speeds.

■ SEES STEEL PRICE REDUCTION LATER THIS YEAR

CHICAGO—Charles S. Traer, president, Acme Steel Co., predicted that steel prices likely will be reduced later this year. He also expects a moderate wage increase to be granted steelworkers, although not near the 18½ cents granted last year.

■ INTRODUCES NEW AUTOMATIC WASHER

ST. JOSEPH, MICH.—Nineteen Hundred Corp. has developed a new automatic washer to be retailed by Sears, Roebuck & Co. Washer was designed by Sundberg-Ferar, Detroit.

■ IRON, STEEL ACCOUNT FOR 95% OF METAL OUTPUT

NEW YORK—Merchant pig iron and steel account for more than 95 per cent of all primary metal output in the United States, according to the American Iron & Steel Institute. Peak annual outputs of the six major nonferrous metals, copper, aluminum, zinc, magnesium and tin, would be equivalent to only 20 days' production by the steel industry at the January, 1947, rate.

■ COAL OPERATORS TO MEET LEWIS APR. 29

PITTSBURGH—Coal mine operators here indicated they will accept the government's invitation to meet with John L. Lewis' United Mine Workers Apr. 29 to discuss a "resumption of collective bargaining." Invitation was issued at Washington by Coal Mines Administrator Collisson.

Pipeline Steel Requirements Mount

Large tonnage involved in pending projects. Heavy industrial and domestic gas demand anticipated. Government studying supply problem

MOUNTING demand for steel for oil and gas pipelines since the war has led to government study of the problem, to see if any action is possible to aid in meeting anticipated expanded fuel needs next winter of both industrial and home consumers.

An interdepartment subcommittee representing interested federal agencies considered a report recently based on a survey showing current pipeline needs. The report was not made public pending study by individual departments, and it was said after the meeting that no specific recommendations are being made.

However, it is known that pending pipeline construction already authorized after consideration by the Federal Power Commission involves about 1 million tons of steel. In addition, there are now before the commission applications for approval of pipeline enlargements and other construction which total another 1,500,000 tons of steel. This total of roughly 2,500,000 tons, it is known, represents projected needs of gas pipelines alone, exclusive of steel needs of oil pipelines.

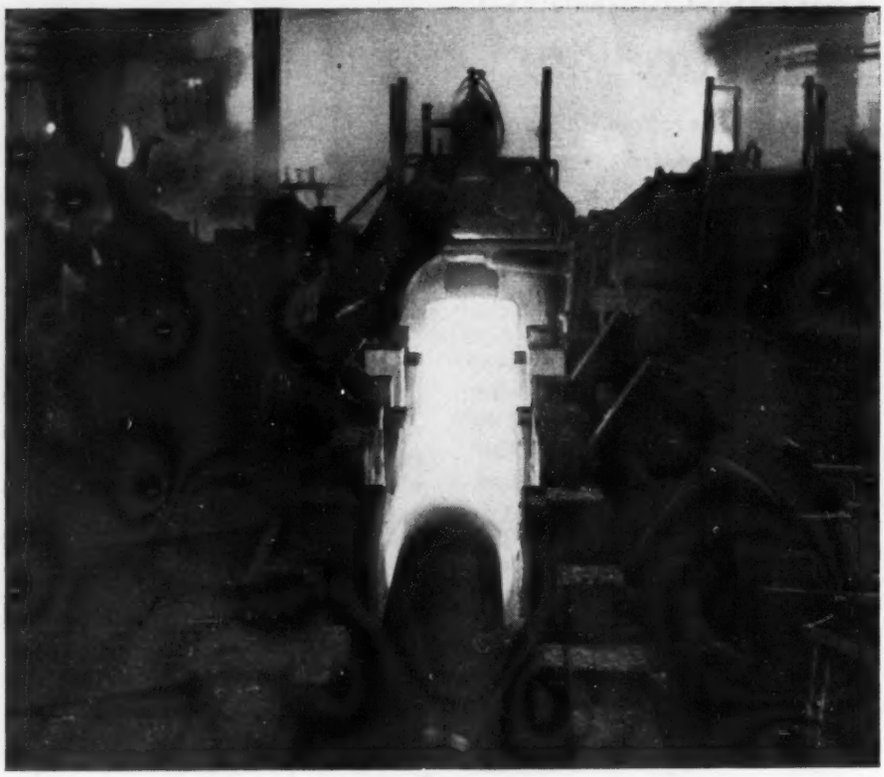
Typical of pending applications is the project of Transcontinental Gas Co. which plans to pipe gas from Texas producing areas to the Philadelphia-New York region.

24 to 26-inch Size in Demand

The situation is complicated by the fact that steel pipe demand is largely in the 24 to 26-inch size. A. O. Smith Corp., Milwaukee, has regularly manufactured 26-inch pipe until recently. National Tube Co. is reported beginning production in this size pipe. Their combined capacity is reported to be approximately 1 million tons annually, but due to shortage in plates, it is understood these companies are not able to produce pipe in this size at capacity.

A third company, Consolidated Steel Corp., on the Pacific Coast, is producing 30-inch pipe, the first time this size has been regularly produced, in order to meet requirements for a gas pipeline 200 miles long, from Texas gas-producing areas to California points.

Taken in conjunction with requirements for oil-country tubular goods, additional demands for pipe in the 18 to 22-inch range, the accelerated freight car building program, and other essential demands for steel plate, the situation is interpreted in some quarters as solvable only by resort to some type of priority system.



Oil and gas pipelines already authorized are estimated to require about a million tons of steel and are placing heavy demand on pipe mills. Photo above shows 24-in. seamless tubing taking final form at the Lorain, O., plant of National Tube Co., United States Steel Corp. subsidiary. The hot shell is being rolled in rotary mill to reduce wall thickness and increase diameter

Some pipeline companies, faced with the necessity of obtaining Federal Power Commission certificates authorizing extension of lines, or new construction, complain that this is unduly handicapping them in placing firm orders for pipe, thus delaying construction.

Texas Eastern Transmission Corp., successful bidder for the Big and Little Inch government pipelines, is operating under an interim certificate, permitting it to pipe gas into the Appalachian area. An application for permanent authority was filed with the commission the latter part of March. Approval would presumably authorize the pipeline company to extend its lines into the eastern industrial consuming area, and might stimulate further pipeline operations in that section.

However, the commission is not expected to act on the application until protracted hearings have been held, at which opposing interests to extension of this and other gas lines, will have their say.

Meanwhile, shortage of natural gas during the winter, was the subject of a complaint by Representative James E. Van Zandt of Pennsylvania, who wrote to Chairman Nelson Smith of the Federal Power Commission, that "the critical shortage of pipe proved a barrier" in obtaining adequate supplies of natural gas from the Southwest for industry needs in western Pennsylvania at the time.

Replying to the letter, Chairman Smith stated the gas shortage was general throughout the northern region of the country from Colorado eastward at the time (Feb. 27), and one of the two principal factors in the situation was "difficulty in obtaining steel pipe" for construction of new pipe lines from the southwest.

Operation of the government-built Inch lines generally portends that increasing supplies of natural gas will be coming into the eastern industrial region. Pending approval of final authority, operators of the two former government lines have installed compressors which have virtually doubled capacity of the lines.

Shortage of steel pipe, it is reiterated in Washington, is the real crux of the situation. Chairman Smith's letter re-

called that in July, 1946, the commission authorized Tennessee Gas & Transmission Co., serving the Appalachian states (New York, Pennsylvania, Ohio, West Virginia and Kentucky) to construct additional facilities to provide approximately 118 million cu ft per day capacity over what it was previously shipping.

"Due to critical shortage of steel pipe" the chairman reported, "the company has been able to complete construction sufficient to add only 18 million cu ft per day to its capacity, and the outlook is uncertain as to when pipe will be available to complete the rest."

Although pipelines serving war industries in Ohio and other industrial centers attained a daily capacity by the war's end of 263 million cu ft of gas, Chairman Nelson stated to Congressman Van Zandt that the war rate continued during the winter, and this capacity did not meet demand during that period.

In passing, Federal Power Commission's regulatory functions have been the subject of protracted dispute among gas companies and others subject to its authority. The commission recently went to some pains to attempt to mollify this opposition, but currently a number of bills to curtail commission authority are pending in Congress, with hearings scheduled to begin on a House bill by Representative Rizley, Okla., (H. R. 2185) while a companion bill by Senator Moore, Okla., waits in the Senate, both aimed at reducing commission powers.

Washington Steel's New Mill Begins Production

T. S. Fitch, president, Washington Steel Corp., Washington, Pa., announced last week commercial operations commenced April 18 on production of precision cold-rolled stainless steel sheets and strip. The first coil of austenitic stainless steel 36 in. wide, rolled on the Sendzimir mill, was reduced from .118-in. to a finished gage of .018 in. in seven passes without the usual intermediate annealing and pickling operations.

This is believed to be the first time in history that such a width of this grade material has been reduced to that extent without intermediate thermal treatment.

Due to unique plant layout and careful choice of equipment, it is expected that the new mill's capacity will reach 1500 tons per month and will employ approximately 150.

Officials of Washington Steel Corp. are: T. S. Fitch, president; F. G. Gerard, vice president of operations; G. E. Diamond, treasurer; J. H. Davidson, secretary; Howard H. Hildreth, assistant secretary; and J. D. Clokey, general sales manager.

Steel Supply Situation Studied By Senate Small Business Group

Conditions in structural fabricating industry considered at hearing. No ready solution of problem indicated in testimony. Committee proposes thorough study of distribution in response to complaints from consumers

BIG VS. LITTLE BUSINESS in the structural steel industry was the subject of two days' hearings by the Senate Small Business Committee last week. Both sides were listened to with sympathy and it was clear the senators, Kenneth S. Wherry (Rep., Neb.), Edward Martin (Rep., Pa.) and Spessard L. Holland (Dem., Fla.), had no ready solution to the problems involved in this issue.

The committee proposes, however, to study the steel industry thoroughly. It has had numerous complaints from small consumers who report they cannot get steel and will have to go out of business unless they get some help soon. The committee wants to see what the specific troubles are, and what sort of legal assistance can prove useful. It was clear from a comment by Chairman Wherry that there is some doubt whether a sure remedy can be found.

"There is nothing new in the situation as revealed by this testimony about conditions in the structural steel industry," said Senator Wherry. "You get the same pattern in almost every industry. We have found it in tires, in oil and in newsprint in connection with our committee work. The big integrated companies are efficient and can save the customer money and give him good service. And yet, for the sake of a healthy economy we have got to keep the independent people, the small interests, alive and in business. It is a tough problem, but we will seek in this committee to find the answers to it."

The complaint studied by the committee last week was that of Robert M. Koch of the Karl Koch Erecting Co., the Bronx, New York. In the old days, before the war, said Mr. Koch, the steel fabricating companies usually quoted two prices, one on the fabricated steel delivered at the building site, and the other the erected price. In those days the Koch firm did a thriving business as an erector of multistory buildings in New York and other eastern cities. Now the situation has changed. In the eastern area there are only two companies that produce a full line of structural shapes, Carnegie-Illinois Steel Corp. and Bethlehem Steel Co. The Carnegie-Illinois shapes are marketed by a sister subsidiary, the American Bridge Co., and the Bethlehem shapes by Bethlehem's fabricated steel construction department. In addition, both companies sell to a few independent structural fabricating companies, but strictly on a quota basis. Bethlehem and American Bridge, continued Mr. Koch, have their own erection crews, so that there are very few opportunities for an independent erector to get an erection contract nowdays.

Mr. Koch addressed his complaint to the circumstances surrounding the letting of the Fort Hamilton Veterans Hospital in Brooklyn to Bethlehem. He put in a bid on the erection of this job, but the Army Engineers could not consider it because no fabricator had put in a bid on the fabricated steel delivered and ready for erection. They had only two bids that they could consider—erected prices quoted by Bethlehem and American Bridge, and of these two interests Bethlehem's bid was the lower. Mr. Koch recommended that the Army Engineers hereafter abandon the practice of calling for combination fabricated and erected bids and, instead, ask for separate bids on fabricated steel and on erection.

Present Practice Held Simpler

Brig. Gen. John S. Bragdon, War Department construction director, told the committee that it would not be feasible to carry out such a suggestion. First, he said, both Bethlehem and American Bridge refuse to bid if they cannot bid a total figure including erection. Second, experience has proven that the government usually gets a lower price and has fewer headaches by dealing with one contractor rather than two or more.

The national policy in regard to keeping small business alive, said General Bragdon, is up to Congress and not at all to the War Department. The Army Engineers, he said, are interested in placing public works under contracts, getting the work done satisfactorily and with dispatch, and in getting it done at the least cost. That will continue to be the general philosophy unless and until the War Department gets a new mandate from Congress.

Senators Martin and Wherry questioned C. A. Johnson about the advisability of adopting a new policy calling for two bids on steel for each veterans hospital, one bid covering fabricated steel delivered and the other cover-

(*Please turn to Page* 161)

Release of Government-Held Scrap Sought by Steel, Foundry Groups

Five associations form joint committee to accelerate flow of scrap from occupied Germany and Pacific islands and conversion of damaged and obsolete Navy and Maritime vessels. "Millions of tons" claimed to be available

RELEASE of "millions of tons" of government-held scrap to relieve the shortage and avert serious curtailment of steel production will be sought by a joint committee organized by five large industry associations.

Robert W. Wolcott, president, Lukens Steel Co., Coatesville, Pa., and chairman of the American Iron & Steel Institute Scrap Committee, is chairman of the joint group to be known as the Steel, Foundry & Scrap Industries Committee for Expediting Iron & Steel Scrap. Association members include the American Iron & Steel Institute, Institute of Scrap Iron & Steel, Steel Founders' Society of America, Gray Iron Founders' Society Inc. and the American Malleable Society.

Outlining the purpose of the committee, Mr. Wolcott said: "Present collection of scrap from the farms and rural areas, plus the generation of scrap by fabricators and automobile graveyards and the daily obsolescence of equipment in this country are not sufficient to meet the demands of the steel and foundry industries.

"If the present scant supply is not augmented, production of finished steel and castings may have to be curtailed, as well as the production of commodities made in whole, or in part, of steel or castings.

"The present visible stocks of iron and steel scrap are the lowest on record and considerably below the quantity on hand in the early part of 1942 when it became necessary to conduct a nationwide scrap drive in order to maintain wartime production of steel and castings.

"The largest and most accessible sources of scrap to increase our present supply are under the control of the United States government as:

"(1) Surplus military and industrial equipment in the United States, occupied Germany and Pacific islands which is no longer usable and, therefore, to be scrapped. This surplus equipment is now under control of War Assets Administration, the Army and the Navy.

"(2) Scrap resulting from warfare and worn-out equipment in occupied Germany and Pacific islands.

"(3) The conversion to scrap of damaged and obsolete Navy and Maritime vessels.

"It is estimated that the potential scrap from these three sources would aggregate many million tons.

"A bold and vigorous policy and program should be adopted by these government agencies in:

"(a) Declaring as scrap and selling these otherwise unusable surpluses.

"(b) The return of all scrap under the control of these agencies for sale at Atlantic and Pacific ports.

"(c) The acceleration of the Maritime Commission and the Navy Department programs for the sale of damaged and obsolete vessels for scrapping."

The active drive will be directed by L. D. Greene and Edwin C. Barringer from Washington headquarters.

Group representation on the joint committee is as follows:

Robert W. Wolcott, Walter S. Tower and L. D. Greene, representing the American Iron and Steel Institute;

Philip W. Frieder, E. C. Barringer and Charles H. Lipsett, representing the Institute of Scrap Iron & Steel;

Edgar D. Flintermann, Steel Founders' Society of America;

R. L. Collier, Gray Iron Founders' Society Inc.;

W. W. MacMillen, Malleable Founders' Society.

Committees will be appointed in each of the 31 cities in which the War Assets Administration has regional offices. Their main duty will be to work closely with each WAA regional director so that government-owned scrap, including machine tools and other items destined to be scrapped, will be disposed of and made available to scrap consumers without delay

Sykes Expects Temporary Recession to Cut Prices

Only through a business recession "of more or less severity" can a general reduction in prices be accomplished, Wilfred Sykes, president, Inland Steel Co., Chicago, told members of the Chicago Junior Association of Commerce recently. Discussing the problems confronting American industry this year, Mr. Sykes pointed to growing signs of such a recession.

"In many lines," he said, "we are now seeing consumer resistance, and from a great many sources, in and out of our own company, I find that it is becoming more and more necessary to sell our goods, rather than dole them out to eager buyers. As the urgent needs are satisfied I think we would be foolish not to realize that we must go through this period of readjustment when prices will be brought more in line with values.

Problems of procurement still face many manufacturers, he said, but "the difficulties that arise from the lack of

STEEL INGOT PRODUCTION STATISTICS

Based on reports by companies which in 1946 made 97.6% of the open hearth, 100% of the bessemer and 85.8% of the electric ingot and steel for castings production

	Estimated Production—All Companies								Calculated weekly production all companies	Number of weeks in mo.
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
1947	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	
Jan.	6,544,841	95.1	384,096	87.7	283,740	65.8	7,212,677	93.0	1,628,144	4.43
*Feb. ...	5,830,371	93.8	314,712	79.6	276,779	71.1	6,421,862	91.7	1,605,466	4.00
†March .	6,622,839	96.2	378,781	86.5	282,896	65.6	7,284,516	94.0	1,644,360	4.43
†1st qtr..	18,998,051	95.1	1,077,589	84.8	843,415	67.4	20,919,055	93.0	1,626,676	12.86
1946										
Jan.	3,528,090	51.1	207,512	47.4	136,452	29.2	3,872,054	49.6	874,053	4.43
Feb.	1,300,944	20.9	25,905	6.6	65,668	15.6	1,392,517	19.8	348,129	4.00
March ..	5,946,698	86.2	363,949	83.1	196,400	42.0	6,507,047	83.3	1,468,859	4.43
1st qtr...	10,775,732	53.8	597,366	47.0	398,520	29.4	11,771,618	51.9	915,367	12.86
Apr.	5,333,139	79.8	286,088	67.5	241,031	53.3	5,860,258	77.5	1,366,028	4.29
May	3,699,979	53.6	153,409	35.0	219,064	46.9	4,072,452	52.2	918,289	4.43
June ...	5,145,594	77.0	251,253	59.2	227,979	50.4	5,624,826	74.4	1,311,148	4.29
2nd qtr..	14,178,712	69.9	690,750	53.7	688,074	50.1	15,557,536	67.9	1,195,814	13.01
1st 6 mos.	24,954,444	61.9	1,288,116	50.4	1,086,594	39.8	27,329,154	59.9	1,056,403	25.87
July	6,023,799	87.5	365,332	83.6	228,083	48.9	6,617,214	84.9	1,497,107	4.42
Aug. ...	6,287,617	91.1	373,837	85.4	261,755	56.0	6,923,209	88.7	1,562,801	4.43
Sept. ...	5,947,688	89.2	371,465	87.8	235,054	52.1	6,554,207	86.9	1,531,357	4.28
3rd qtr..	18,259,104	89.3	1,110,634	85.6	724,892	52.3	20,094,630	86.8	1,530,436	13.13
9 mos...	43,213,548	71.1	2,398,750	62.2	1,811,486	44.0	47,423,784	69.0	1,215,994	39.00
Oct.	6,308,845	91.4	387,933	88.6	253,562	54.3	6,950,340	89.0	1,568,926	4.43
Nov.	5,869,767	87.8	318,350	75 1	268,655	59.4	6,456,772	85.4	1,505,075	4.29
Dec.	5,283,651	76.7	222,704	51.0	253,353	54.3	5,759,708	73 9	1,303,101	4.42
4th qtr..	17,462,263	85.3	928,987	71.5	775,570	56.0	19,166,820	82.8	1,458,662	13.14
2nd 6 mos.	35,721,367	87.3	2,039,621	78.5	1,500,462	54.1	39,261,456	84.8	1,494,536	26.27
Total ...	60,675,811	74.7	3,327,737	64.6	2,587,056	47.0	66,590,604	72.5	1,277,150	52.14

† Preliminary. * Revised.

For 1947 percentages are calculated on weekly capacities of 1,553,721 net tons open hearth, 98,849 bessemer, and 97,358 net tons electric ingots and steel for castings, total 1,749,928 net tons; based on annual capacities as of Jan. 1, 1947, as follows: Open hearth 81,010,990 net tons, bessemer 5,154,000 net tons, electric 5,076,240 net tons, total 91,241,230 net tons.

For 1946, percentages are calculated on weekly capacities of 1,558,041 net tons open hearth, 98,849 net tons bessemer and 105,491 net tons electric ingots and steel for castings, total 1,762,381 net tons; based on annual capacities as of Jan. 1, 1946, as follows: Open hearth 81,236,250 net tons, bessemer 5,154,000 net tons, electric 5,500,290 net tons, total 91,890,540 net tons.

raw materials . . . . are being solved rapidly. The situation has been particularly acute as regards metals." With "the post-reconversion rush by every business to get back into normal production and to retrieve or retain its place in the markets," demand in many lines has far exceeded supply, in spite of the general increase in supply over prewar years.

These shortages have been accentuated, he declared, by the desire of manufacturers to build up inventories "out of all reason in relation to their normal peacetime business" so as to insure operations against delays due to lack of raw materials. "This attempt to build up excessive inventories carries with it considerable danger for the solvency of many of the smaller concerns because they are likely to be caught with slow-moving goods and unfinished material far in excess of what they can finance in a period of low business activity."

A counter-inflationary trend which will develop, he indicated, as a result of the increasing degree to which consumers question merchandise both as to price and quality will force manufacturers "to learn again that quality must be commensurate with price." Some adversity is necessary, he declared, to make manufacturers realize the deterioration of business standards which accompanied the war will no longer be tolerated in a competitive market. "We will have to become more conscious of tightened budgets as part of the process of reducing costs so that prices can also be reduced," he continued.

"The duration of this period of recession or depression, whichever word you like, may be affected by a great many factors. If we can be free from government interference industry will pull out rather quickly.

"While I am satisfied," he added, "there will be a temporary slowdown in business which is necessary to bring about realistic prices and quality, I am also equally positive that such a period will be relatively short if we are left alone. There is an enormous pent-up demand for things really needed in this country which will take us a decade to fill even at a maximum rate of operations. So much of our housing, public utilities, manufacturing facilities, etc. require rebuilding or rehabilitating that, I believe, the estimates that have been made rather understate the problem. Our civilian needs can provide us with a period of business activity and prosperity equal to anything we have known in the past if our efforts and resources can be directed towards supplying these needs. If our resources are to be siphoned off by taxation and used for no productive purposes, then we can take the other road and slide downhill."

Less Than 1 Per Cent of Pig Iron Production Now Being Allocated

LESS than 1 per cent of total pig iron output and less than 0.4 per cent of northern pig iron production are being allocated by the government, according to R. E. Johnson, deputy housing expediter in charge of the Office of Production.

Amount certified to producers of cast iron soil pipe and fittings, the only ones to have received allocations since Mar. 31, for April is 36,300 tons of foundry and malleable pig iron. Total production of all grades of pig iron was estimated (before the coal stoppage) at 4,500,000 to 5,000,000 tons, including 400,000 to 450,000 foundry and malleable grades.

March certifications exceeded 150,000 tons, but included pig iron for producers of pressure pipe, radiation, heating and plumbing equipment and other housing items which are no longer included in the certification system.

Tight supplies were attributed to the fact that steel mills which normally use 85 to 90 per cent of pig iron production have preferred to use larger amounts of lower-cost pig iron made in their own blast furnaces rather than higher-priced steel scrap.

"A 1 per cent increase in the use of pig iron by the steel mills," Mr. Johnson said, "can mean a cutback of 8 to 10 per cent in the availability of foundry iron if there is no overall increase in pig iron production."

Whiton Machine Co. Takes Over D. E. Whiton Machine

Whiton Machine Co., New London, Conn., has been organized and has acquired the business and properties of D. E. Whiton Machine Co., New London, manufacturer of steam turbine engines, automatic gear cutting machines, centering machines and lathe chucks.

D. E. Whiton Machine Co. was incorporated in 1857 to manufacture lathe chucks. Founded in West Stafford, Conn., the firm moved to New London, Conn., in 1886.

Lucius E. Whiton, son of the founder of the old company, is chairman of the board of directors of the new firm, and George A. Highberg, for the past 10 years vice president of Cushman Chuck Co., Hartford, is the company's president.

FINISHED STEEL SHIPMENTS IN JANUARY

Steel Products	Number of companies	Items	JANUARY - 1947			Whole Year 1946		
			Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Per cent of Total Shipments	Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)	Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products For Resale) (Net Tons)	Per cent of Total Shipments	Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	33	1	199,974	4.0	182,382	1,949,624	4.0	1,645,748
Structural shapes (heavy)	12	2	352,822	7.0	9,429	3,474,284	7.1	5,399
Steel piling	4	3	28,958	0.6	-	205,313	0.4	181
Plates (sheared and universal)	26	4	467,548	9.3	17,741	4,152,181	8.5	250,709
Skelp	5	5	13,684	0.3	39,355	227,033	0.5	194,666
Rails—Standard (over 60 lbs.)	6	6	213,300	4.2	-	1,790,311	3.7	4,890
—All other	5	7	13,403	0.3	22	144,999	0.3	426
Joint bars	7	8	14,573	0.2	1,359	176,803	0.4	5,327
Tie plates	8	9	43,352	0.9	815	447,496	0.9	18,700
Track spikes	8	10	14,282	0.3	-	146,194	0.3	693
Hot Rolled Bars—Carbon	30	11	524,669	10.4	72,383	5,006,859	10.3	707,991
—Reinforcing—New billet	15	12	93,108	1.9	730	1,048,483	2.1	7,381
—Rerolled	11	13	11,084	0.2	-	141,346	0.3	1,267
—Alloy	25	14	153,348	3.0	18,746	1,390,278	2.8	138,399
—TOTAL	41	15	782,209	15.5	91,859	7,586,966	15.5	855,034
Cold Finished Bars—Carbon	27	16	134,720	2.7	423	1,316,579	2.7	2,428
—Alloy	23	17	24,532	0.5	118	196,237	0.4	1,725
—TOTAL	33	18	159,252	3.2	541	1,512,816	3.1	4,153
Tool steel bars	19	19	8,492	0.2	367	96,080	0.2	371
Pipe & Tubes—Butt weld	13	20	121,290	2.4	5,118	1,276,289	2.6	45,393
—Lap weld	8	21	35,469	0.7	184	305,516	0.6	238
—Electric weld	11	22	64,162	1.3	1,009	674,459	1.4	591
—Seamless	11	23	175,722	3.5	13,608	1,871,540	3.8	83,441
—Conduit	6	24	9,783	0.2	710	98,521	0.2	2,448
—Mechanical and pressure tubing	11	25	54,411	1.1	1,521	429,180	0.9	3,478
Wire rods	20	26	59,558	1.2	20,277	679,998	1.4	346,506
Wire—Drawn	28	27	212,217	4.2	17,111	1,933,124	4.0	135,592
—Nails and staples	18	28	77,480	1.5	377	636,632	1.3	797
—Barbed and twisted	14	29	20,497	0.4	-	207,610	0.4	-
—Woven wire fence	13	30	35,591	0.7	322	383,230	0.8	-
—Bale ties	12	31	9,810	0.2	15	99,993	0.2	-
Black Plate—Ordinary	9	32	78,383	1.5	426	781,167	1.6	3,179
—Chemically treated	8	33	5,727	0.1	-	125,170	0.3	-
Tin and Terne Plate—Hot dipped	9	34	159,082	3.1	-	1,924,657	3.9	-
—Electrolytic	9	35	89,083	1.8	-	909,173	1.9	-
Sheets—Hot rolled	27	36	593,560	11.8	52,566	5,521,463	11.3	421,198
—Cold rolled	17	37	416,089	8.3	526	4,075,554	8.4	3,597
—Galvanized	15	38	139,794	2.8	20	1,462,053	3.0	1,725
—Electrical and enameling	10	39	49,759	1.0	199	435,170	0.9	-
Strip—Hot rolled	22	40	145,600	2.9	27,164	1,363,812	2.8	237,176
—Cold rolled	32	41	115,607	2.3	12,722	1,282,146	2.6	25,904
Wheels (car, rolled steel)	5	42	34,241	0.7	-	252,308	0.5	348
Axles	5	43	15,264	0.3	-	150,461	0.3	221
All other	-	44	-	-	-	6,266	-	-
TOTAL STEEL PRODUCTS	139	45	5,030,008	100.0	497,745	48,775,532	100.0	4,297,889

Increased Castings Production To Be Stressed at AFA Meeting

Association's 51st annual convention, to be held in Detroit next week, will feature more than 50 technical, general and shop-course sessions. Max Kuniansky, AFA vice president, to be named 1947-48 president

GEORGE T. CHRISTOPHER

DETROIT WILL be host next week to more than 5000 foundry executives and technologists when they assemble to discuss the pressing problem of raising the industry's volume of castings to meet the unrivaled peacetime demand. Attendance at the American Foundrymen's Association's 51st annual convention, which will begin Apr. 28 and last through May 1, will include members and visitors from both North and South America and countries outside the Western Hemisphere.

To spotlight new developments and refinements in foundry techniques, processes and metallurgical controls, more than 50 technical, general interest, round table and shop-course sessions dealing with both ferrous and nonferrous casting practices will be held.

"Why the Importance of the Foundry Industry," an address to be delivered by George T. Christopher, president and general manager, Packard Motor Car Co., Detroit, will keynote the convention at its opening-day general session in the Rackham Educational Memorial.

With the exception of Monday's activities, Detroit's Book-Cadillac and Statler hotels will be the scene of the convention's meetings. Registration headquarters will be maintained in both hotels.

Chapter Programs To Be Discussed

Officers and directors of AFA will hold their annual dinner Tuesday at the Statler. Speaker will be Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburg, Va., and AFA vice president and nominee for president for 1947-48, who will talk on the importance of chapter programs.

A steel technical session to be held Tuesday will be highlighted by the exchange paper of the Institute of British Foundrymen. F. Cousans, Catton & Co. Ltd., Leeds, England, will describe "Side-Blown Converter Practice." Effect of melting practice on properties of medium-carbon low alloy cast steels and the influence of selenium on the sulphide form and ductility of cast steel will also be covered at the meeting.

Other topics of Steel Division-sponsored technical sessions are as follows: Slag control in the acid electric furnace; application of a single slag process to basic electric steel; occurrence of intergranular fracture in cast steels; segregation in small steel castings; determination of molten metal temperatures; and temperature distribution in metal molds. A round table luncheon discussion for steel foundrymen will be held at Hotel Statler Thursday.

Election of officers and directors will feature the annual business meeting Wednesday, at which time the first Charles Edgar Hoyt Annual Lecture will be delivered by Dr. James T. MacKenzie, chief metallurgist and a director of American Cast Iron Pipe Co., Birmingham. His subject will be "The Cupola Furnace."

Max Kuniansky will be elected the 46th AFA president, and W. B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, who served as an AFA director in 1943-1946, will be named vice president.

Directors to be elected are: E. N. Delahunt; W. J. MacNeill, general manager, G. H. R. Foundry Division, Dayton Malleable Iron Co., Dayton, O.; R. H. McCarroll, chemical and metallurgical engineering and research director, Ford Motor Co., Dearborn, Mich.; J. M. Robb Jr., resident manager, Hickman, Williams & Co., Philadelphia; and A. C. Ziebell, president and treasurer, Universal Foundry Co., Oshkosh, Wis.

At the annual AFA "alumni" dinner Wednesday, past officers, directors and medallists of AFA will hear John H. Van Deventer, director of information, Committee for Economic Development, New York, discuss "Broadening Economic Horizons." Fred J. Walls, Detroit office manager, International Nickel Co., and past president, AFA, will preside.

Joseph Sully, president, Sully Foundry Division, Neptune Meters Ltd., Toronto, Ont., will officiate at the annual Canadian luncheon, Wednesday.

Presentation of AFA medals will be made at Thursday's banquet to the following: Russell J. Allen, metallurgical engineer, Worthington Pump & Machinery Corp., Harrison, N. J.; Dr. Richard A. Flinn, metallurgist, American Brake Shoe Co., Mahwah, N. J.; Harry M. St. John, superintendent, brass foundry and forge shop, Crane Co., Chicago; and Henry S. Washburn, president, Plainville Casting Co., Plainville, Conn. Honorary membership in the association will be conferred on John Grennan, instructor in foundry practice, University of Michigan, Ann Arbor, Mich., and on Sheldon V. Wood, president of the AFA.

Machinery Show, Forum Depicts Southern Industrial Progress

INDUSTRIALIZATION of the South was concretely demonstrated when the doors of Atlanta's Municipal Auditorium were thrown open last Monday for the second Southern Machinery & Metals Exposition. The show and concurrent industrial forum lasted through Thursday, April 17, and attracted more than 15,000 visitors who saw the products of southern industry as well as those from other sections of the country.

Seven steel companies and seven foundries participating in the exposition showed dies, parts, stampings and subassemblies made in southern plants. Finished products, including machinery for manufacturing concrete blocks, machine tools, metal trailers, welding equipment, electrical apparatus and materials handling equipment, were also shown.

The number of non-southern companies represented in the exhibits indicated nation-wide interest in the rise of the South's industrial potential. Both Ford Motor Co. and General Motors Corp. displayed parts which might be suitable for southern manufacture. These companies had representatives of their purchasing departments in attendance to answer questions.

The industrial forum was sponsored

by Georgia chapter, American Society for Metals in co-operation with the Georgia Engineering Society, Georgia Society for Measurement & Control, the Atlanta chapter of the Society for the Advancement of Management, the Southeastern Electroplaters Society and the Southern Material Handlers Association. First meeting of the forum was addressed by C. R. Allen, Ford Motor Co., Dearborn, Mich., who spoke on the effect of the automotive decentralization program.

Other speakers at the forum included the following: Charles T. O'Connell, tool engineer and southern representative, Asheville, N. C., for Kennametal Inc., Latrobe, Pa., who discussed "Recent Developments in Cemented Carbides;" Dr. Gourdon M. Butler, associate director of research, Allegheny Ludlum Steel Corp., Pittsburgh, speaking on "Getting the Most out of High Carbon-High Chrome Die Steels;" George V. Luerssen, assistant chief metallurgist, Carpenter Steel Co., Reading, Pa., whose topic was "Co-ordinating Our Efforts Toward Better Tools;" J. H. W. Conklin, sales manager, Clark Tructractor Division, Clark Equipment Co., Battle Creek, Mich., who spoke on "The Science of Material Handling." His talk was followed by a panel discussion concerned with materials handling operations in the South. George T. Fraser, manager, Rexalloy Division, Crucible Steel Co. of America, New York, was another forum speaker.

During the show visits to the Auto-Soler Co., Atlantic Steel Co. and Southern Spring Bed Co. plants in Atlanta were also made.

Aluminum Foundry Practice Discussed by Metallurgist

There is much to be done to eliminate improper practice in aluminum foundry work, R. A. Quadt, research metallurgist specializing in the aluminum field for Federated Metals of New York, stated before a Milwaukee area meeting of the American Foundrymen's Association recently. Sounder castings and fewer rejects may be gained through relatively simple precautions provided the foundryman understands the basic roots of the trouble, he asserted.

Urging preheating to prevent gassing, Mr. Quadt went on to discuss partial pressure phenomena of nascent hydrogen produced from moisture and hydrocarbons during melting, this constituting the principal cause of gassing in aluminum castings. Touching upon the use of chlorine and dry nitrogen for flushing objectionable gases, and emphasizing the proper planning of gates and risers in mold design, the speaker also presented data on the minimizing of trapped oxides and fluxes by eliminating agitation.

Topic of Mr. Quadt's talk was "Common Foundry Problems in Aluminum Castings." It covered modern techniques in each of three vital production steps: Preparation of the metal in its molten condition; actual casting procedure; and satisfactory production of molds.

Finishing Exposition Set For June 23-27 in Detroit

More than 100 manufacturers from all parts of the country will exhibit their latest equipment, materials, services, processes and plated products at the Industrial Finishing Exposition, to be held in Detroit, June 23 to 27, in conjunction with the annual convention of the American Electroplaters' Society.

Features of the exposition will include a completely equipped plating installation, fully automatic and semi-automatic plating process machinery, polishing and buffing equipment and a graphic illustration of one of the largest plating installations in the world. A recent development in the industry, the generator control or "current reversal," will be on display, as will other recent developments in temperature, automatic fluid or solution level controls. The convention, itself, with headquarters at Hotel Statler, will be highlighted by five technical sessions and field trips to various Detroit factories.

Pressed Metal Group Holds Cleveland District Meeting

Cleveland District of Pressed Metal Institute will hold its spring meeting at Hotel Cleveland, Friday, April 25. R. C. Todd, vice president, American Rolling Mill Co., Middletown, O., will be the featured speaker with a talk on "The Complete Steel Picture." New officers will be elected. C. A. Rooke, Freeway Washer & Stamping Co., Cleveland, is the district chairman.

Calendar of Meetings . . .

Apr. 21-23, National Open Hearth Steel Committee of AIME: Thirtieth annual conference, Netherland Plaza Hotel, Cincinnati. Committee headquarters are at 29 W. 39th St., New York.

Apr. 24, American Society for Metals: Ninth annual meeting of Cincinnati, Columbus and Dayton, O., chapters, Fort Hayes Hotel, Columbus. Reservation chairman is R. E. Christin, Columbus Bolt Works Co., Columbus.

Apr. 24-25, American Management Association: National conference on production methods and management, Hotel New Yorker, New York. Association president is Alvin E. Dodd, 330 W. 42nd St., New York.

Apr. 25, Pressed Metal Institute: Spring meeting of Cleveland district, Hotel Cleveland, Cleveland. Institute headquarters are at 829 Union Commerce Bldg., Cleveland.

Apr. 28-29, American Zinc Institute: 29th annual meeting, Hotel Statler, St. Louis. Headquarters are at 60 E. 42nd St., New York 17.

Apr. 28-30, Santa Monica Chamber of Commerce: First Annual Industrial show, Santa Monica Technical School, Santa Monica, Calif.

Apr. 28-May 1, Chamber of Commerce of the United States: Thirty-fifth annual meeting, Washington.

Apr. 28-May 1, American Foundrymen's Association: Annual convention, Book-Cadillac and Statler hotels, Detroit. Association headquarters are at 222 W. Adams St., Chicago.

Apr. 29-30, May 1, Industrial Packaging Engineers Association: Second annual exposition, Hotel Sherman, Chicago. Managing director is C. J. Carney Jr., 20 W. Jackson Blvd., Chicago.

May 1-2, Society of Automotive Engineers: Personal aircraft meeting, Hotel Lassen, Wichita, Kans.

May 5-6, National Welding Supply Association: Annual convention, Philadelphia.

May 5-9, American Gas Association: Industrial Gas School, Seneca Hotel, Columbus, O. Chairman is Karl Emmerling, 420 Lexington Ave., New York.

May 6-10, Society of the Plastics Industry: Second National Plastics Exposition, Coliseum, Chicago. Society's headquarters are at 295 Madison Ave., New York.

May 8-9, Magnaflux Weld Inspection Conference: Congress Hotel, Chicago. Sponsored by Magnaflux Corp., Chicago.

May 11-14, American Supply & Machinery Manufacturers' Association Inc.: 1947 Convention, Hotel Traymore, Atlantic City, N. J. R. Kennedy Hanson, 1108 Clark Bldg., Pittsburgh, general manager.

May 12-15, American Steel Warehouse Association: 38th annual meeting, Biltmore Hotel, Los Angeles. Association president is Walter S. Doxsey, 442 Terminal Tower, Cleveland.

May 12-15, American Mining Congress: 1947 annual coal convention and exposition in Cleveland. Association secretary is Julian D. Conover, 309 Munsey Bldg., Washington.

May 15-17, Society for Experimental Stress Analysis: Annual meeting, Stevens Hotel, Chicago. Society's address is P.O. Box 168, Cambridge 39, Mass.

May 18-24, World Trade Week: Sponsored nationally by the Chamber of Commerce.

May 21-22, American Iron & Steel Institute: 55th general meeting, Hotel Pierre and the Waldorf-Astoria, New York. Institute headquarters are at 350 Fifth Ave., New York 1.

May 21-24, American Society of Mechanical Engineers: 19th national conference on oil and gas power, Cleveland.

May 22-24, Automotive Engine Rebuilders Association: Silver anniversary convention at Hotel Statler, Detroit. R. G. Patterson, 415 N. Capitol Ave., Indianapolis, is association executive vice president.

May 23-24, Institute of Metals Division, AIME: Boston regional conference, Hotel Sheraton, Boston. Conference chairman is H. I. Dixon, Sterling Alloys Inc., Boston.

May 26-27, Association of Iron & Steel Engineers: Annual Spring Conference, Benjamin Franklin Hotel, Philadelphia.

May 26-29, American Society of Mechanical Engineers: Aviation meeting, Los Angeles.

May 27, Metal Powder Association: Third annual spring meeting at Waldorf-Astoria Hotel, New York. Association headquarters are at 420 Lexington Ave.

June 1-6, Society of Automotive Engineers: Summer meeting, French Lick Springs Hotel, French Lick, Ind.

June 2-4, American Gear Manufacturers Association: 31st annual meeting, The Homestead, Hot Springs, Va. Association executive secretary is Newbold C. Goin, Empire Building., Pittsburgh.

June 2-4, National Association of Purchasing Agents: Annual convention, Waldorf-Astoria Hotel, New York. Association headquarters are at 11 Park Place, New York.

June 5-7, Electric Metal Makers Guild Inc.: Fifteenth annual meeting, Hotel Roosevelt, Pittsburgh. Association president is J. F. Arthur, Box 6026, Mt. Washington Sta., Pittsburgh.

Selling Problems, Fall Exposition Discussed by Machine Tool Builders

Industry looks to sales-stimulating effect of show scheduled for Chicago, Sept. 17-26 to offset effects of surplus tool sales at reduced prices. Builders advised to seek to regain substantial share of foreign trade

By GUY HUBBARD
Machine Tool Editor, STEEL

ATLANTIC CITY, N. J.

MORE than 200 representatives of member companies in the National Machine Tool Builders' Association were present at the 45th annual meeting of the association at Haddon Hall Hotel, April 16, at which word was given for immediate launching of a world-wide campaign in behalf of the big machine tool exposition which will be staged at Chicago, Sept. 17-26.

What otherwise might have been a convention marked by some pessimism as to the immediate business outlook, became a gathering imbued with high hopes that a serious downswing will be averted by the tremendous sales stimulating effect of sweeping improvements in products and worldwide promotion of these improvements by working demonstrations to nearly 100,000 metalworking industry executives expected to attend the show, the theme of which will be: "More goods for more people, at lower cost—by means of new and improved machine tools."

Considerable Surplus Remains

In his opening address, Herbert H. Pease, president of the association and of the New Britain Machine Co., New Britain, Conn., mentioned that since its Quebec meeting, last October, the machine tool industry has entered a period of uncertainty. Sales of surplus machinery at prices well below cost has taken heavy toll of new business. A considerable amount of WAA machinery still remains to be liquidated, although the cream of the quality material has been pretty well skimmed off.

Mr. Pease believes the government's policy of selling this equipment as rapidly as possible at any price, may in the end work out for the best. In the meantime, he urged that the machine tool builders stick faithfully to their job of designing and building machines which will make better products at lower cost despite higher wages.

He mentioned that legislation, now pending, may establish a strategic reserve of 80,000 machine tools, with a possibility that this may be raised to 250,000 units.

Mr. Pease expressed hope that the Geneva Conference plus better co-operation on the part of the Export-Import Bank will help the industry to regain a substantial place in foreign trade—which before the war accounted for 20 per cent of its business. However, with England, Czechoslovakia, Sweden, France, Switzerland and Italy more active in machine tool building than ever before, our trade abroad in machine tools by no means will come as easily as in years gone by. Special high production machines hold the greatest possibilities.

"Potentials for high economy still exist," Mr. Pease said. "What our machine tool industry will reveal at the Chicago show in the way of materializing that high economy, will make the best of the WAA machines 'look sick.' We approach the economic hurdles with supreme confidence that we will jump those hurdles!"

Tell Berna, general manager of the association, echoed Mr. Pease's sentiments when he remarked: "Emphasis now is on selling; emphasis now is on our big machine tool show. Our public relations efforts must not be by fits and starts—they must be continuous. We already have aroused realization in high government circles that machine tools are just as important in peace as they are in war. The Department of State is interested and so also is the Department of Commerce. We are in the midst of a technological revolution. Wartime machine tools no longer are any criterion for metalworking speed, convenience and economy."

A first-hand picture of conditions in Germany was presented by Erik Oberg, editor emeritus, *Machinery*, who has just returned from a government-sponsored editorial inspection trip. He reported growing conviction among the western allies that the Potsdam agreement is too severe to allow German industry even to get to its feet. General Clay is not in favor of dismantling any more of Germany's plants, because if it is done, Germany will not get back to work to any adequate extent, and "Germany in chaos means western Europe in chaos."

Banquet speaker on Tuesday evening was Dr. Alan Valentine, president, University of Rochester, his subject being "Private Enterprise in Higher Education." Dr. Valentine believes education essentially is a matter of the enterprise of the individual.

James Y. Scott, chairman, Committee on Government Relations, and president, Van Norman Co., Springfield, Mass., recommended that government-owned machine tools for which there is no commercial demand be made more readily available to schools. "The present procedure," he said, "not only is complex, but the price set at 5 per cent of fair market value is more money than schools can afford to pay. We strongly recommend that such machines be offered to schools at $1.00 a piece." Mr. Scott also echoed the hope expressed by Mr. Pease that a really adequate national reserve of machine tools be a part of our defense setup.

Herbert Tigges, vice president, Baker Bros. Inc., Toledo, O., made concrete suggestions toward improving machine tool selling methods. First and foremost, there must be closer co-operation between engineering, selling and manufacturing, to the end that engineering and production will result in machines which fit needs of users, as interpreted by sales engineers who really understand market conditions.

That in turn means that better trained sales engineers are needed—men with college training supplemented by practical shop and engineering experience.

Urges Promotion of Industry

In a talk on "Public Relations," William L. Dolle, president, Lodge & Shipley Machine Tool Co., Cincinnati, repeated the plea voiced several months ago by Joseph Trecker that the industry quit talking to itself and use its energy in talking up its merits to those outside the industry—including teachers and clergymen. Mr. Dolle told of the tremendous value of the association's booklet, "Ten Great Inventions," in answering the false charge that machines put people out of work.

Rounding up the overseas market outlook, A. S. Keller, vice president, Pratt & Whitney, West Hartford, Conn., stated that the job of the export manager today is harder than at any time in the history of the industry.

Closing address was by Frederick S. Blackall Jr., president and treasurer, Taft-Peirce Mfg. Co., Woonsocket, R. I., on: "The Tax Outlook." He said that widespread confusion exists between rigid procedures such as five-year amortization under necessity certificate and the broad proposal for greater latitude whereby a taxpayer can depreciate his capital assets on whatever plan and over whatever period fits his case.

Four-Year Decline In Steel Company Earnings Reversed During 1946

A FOUR-YEAR downward trend in net earnings of the steel industry was reversed in 1946. This resulted, however, not so much from high level of operations or increased sales, for actually the aggregate of each declined, but it came about principally through reduced operating costs and reduction in federal tax rates.

Lower operating costs in 1946 largely reflected the completion in 1945 of amortization of war emergency facilities. Also helping make the net income figure appear as favorable as it did in 1946 was the use of substantial sums from contingency funds to help offset costs of strikes and other unusual expenses.

For 1946, STEEL's annual financial analysis of the steelmaking industry showed that 25 ingot producers representing 88.38 per cent of the nation's ingot capacity had aggregate net income of $246,718,641, compared with $172,281,467 in 1945. However, three of the companies reported a net deficit for 1946, while in 1945 only one showed a loss.

Notwithstanding the improvement in earnings position in 1946, the net income of the 25 companies was approximately $124,400,000 less than the net income of only 18 steel companies in the peacetime banner year of 1929.

Total income before dividends and interest on bonds amounted to $264,061,529 in 1946, compared with $205,393,232 in 1945. Because of the rise in total income and an increase in capitalization from $3,913,922,414 in 1945 to $4,071,978,628 in 1946 the total income before dividends and interest on bonds in 1946 was equivalent to 6.48 per cent of the capitalization, an improvement over the 5.24 per cent in 1945.

Reflecting principally the effects of the steelworkers' strike in 1946, but also two coal miners' strikes and various other handicaps stemming from the war and reconversion, the ingot production rate of 20 of the 25 companies that year was only 75.42 per cent of capacity, compared with 91.02 per cent in 1945. This decline was drastic enough to cut total ingot output of 21 of the 25 producers from 68,293,267 net tons in 1945 to 56,779,615 in 1946. Meanwhile, the rated ingot capacity of 24 of the 25 companies edged up from 80,410,555 net tons in 1945 to 80,644,125 tons.

Also showing effects of the steelworkers' strike as well as a shift from war business to peacetime pursuits is the sum of net sales for 24 of the companies. In 1945, the total was $5,557,013,329, but in 1946 it dropped to $4,491,529,424. Although total net sales declined, average net profit margin (net income divided by net sales) rose from 3.06 per cent in 1945 to 5.53 per cent in 1946 because of the substantial improvement in net income.

Along with the upturn in net earnings in 1946 went an increase in total federal income taxes, the aggregate for the 25 steel producers being $119,580,310 in 1946, compared with $109,808,569 in 1945.

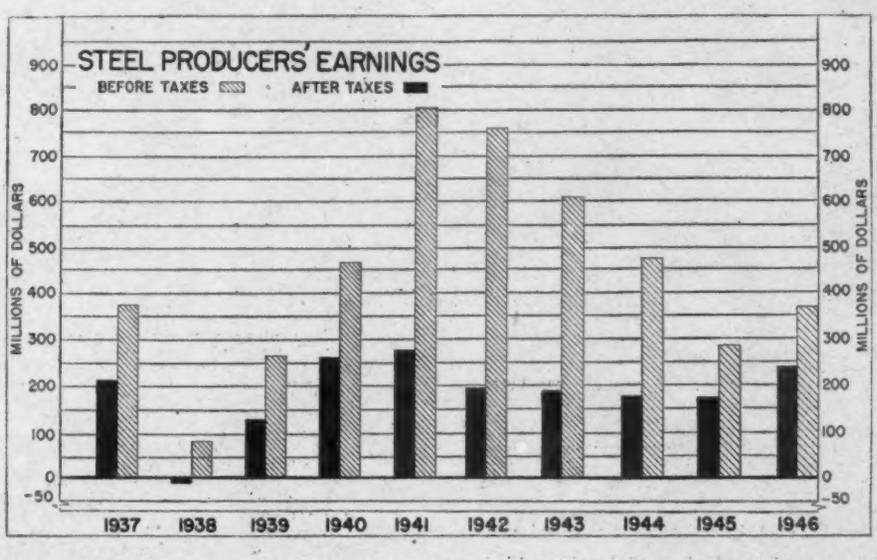
Employment showed a decline in 1946, the average number of employees of 24 companies being 707,169, compared with 768,928 for the preceding year, during part of which the demands of war were a buoyant factor in employment. As a result of that decline in employment, reduction in overtime and the steelworkers' strike which temporarily suspended wage payments, the total payrolls of the 25 companies in 1946 dropped to $1,885,720,522, compared with $2,267,543,853 of 1945.

In adjusting for peacetime operations, the 25 companies increased their aggregate funded debt from $478,679,600 in 1945 to $539,531,967 in 1946.

Principally because of the steelworkers' strike, four of the steel producers found it expedient in 1946 to draw on contingency funds to the extent of $47,312,714. In 1945, two companies drew on their contingency funds for $39,828,027 because of unusual costs. Resort to this procedure contributed much to the favorable aspect of the aggregate net income figure of the steel industry in 1946.

The improved earnings position of the industry enabled the average earnings per common share of stock to rise to $5.08 in 1946, compared with $3.62 in 1945. Preferred dividend requirements receded from $44,088,404 in 1945 to $41,928,357 in 1946.

Aggregate current assets and current liabilities both rose in 1946 but because of the greater proportionate increase in the latter the ratio of current assets to current liabilities declined to 3.22 to 1. In 1945, it was 3.68 to 1.



STEEL acknowledges with appreciation the cooperation of the companies which provided data for the summary, additional copies of which may be obtained from Readers' Service Dept., STEEL.

	Number of Shares of Common Stock Outstanding		Common Stock Valuation		Preferred Stock Valuation	Preferred Stock Valuation
	1946	1945	1946	1945	1946	1945
United States Steel Corp.	8,703,252	8,703,252	$652,743,900	$652,743,900	$360,281,100	$360,281,100
Bethlehem Steel Corp.	2,984,994	2,984,994	283,574,430	283,574,430	93,388,700	93,388,700
Republic Steel Corp.	5,669,922	5,669,922	130,309,141	130,309,141	28,214,300	28,214,300
Jones & Laughlin Steel Corp.	2,476,502	1,998,212	96,507,400	80,564,400	29,356,800	45,358,200
Youngstown Sheet & Tube Co.	1,675,008	1,675,008	105,088,053	105,088,053	None	None *‡
National Steel Corp.	2,230,642	2,206,492	55,766,050	55,162,300	None	None
Inland Steel Co.	4,899,315	1,633,105	62,500,000	62,500,000	None	None
American Rolling Mill Co.	3,241,315	3,241,315	32,413,153	32,413,153	19,993,000	44,993,000
Wheeling Steel Corp.	569,559	569,559	28,477,950	28,477,950	36,316,600	36,316,600
Crucible Steel Co. of America	444,230	444,698	11,105,749	11,117,443	31,368,200	31,628,300
Colorado Fuel & Iron Corp.*§	1,126,975	563,620	5,634,875	5,636,200	10,056,635	None
Pittsburgh Steel Co.	508,917	508,917	4,862,190	4,862,190	16,438,220	16,392,580
Lukens Steel Co.	317,976	317,976	3,179,760	3,179,760	None	None
Granite City Steel Co.§†	382,488	382,488	8,483,821	8,483,821	None	None
Sharon Steel Corp.	617,242	392,331	6,232,810	3,974,530	None	5,972,000
Alan Wood Steel Co.	200,000	200,000	4,388,889	4,388,889	7,182,433	7,182,433
Midvale Co.	600,000	600,000	10,574,621	10,574,621	None	None
Allegheny Ludlum Steel Corp.	1,288 286	1,263,186	8,051,787	7,894,912	None	None
Continental Steel Corp.	501,383	200,561†	7,019,263	5,276,243	None	None
Laclede Steel Co.	206,250	206,250	4,125,000	4,125,000	None	None
Keystone Steel & Wire Co.	757,632	757,632	3,156,800	3,156,800	None	None
Follansbee Steel Corp. †*	267,064	217,706	2,670,640	2,177,061	None	2,547,913
A. M. Byers Co.‡#	264,635	264,635	2,646,350	2,646,350	5,439,100	5,566,500
Harrisburg Steel Corp.§‡	183,300	183,300	1,150,000	1,150,000	None	None
Northwestern Steel & Wire Co.	163,565	163,565	817,825	817,825	75,000	75,000
Total (or average)	40,280,452	35,348,724	$1,531,480,457	$1,510,294,972	$638,110,088	$677,916,626

	Preferred Dividend Requirements		Earnings Per Common Share		Dividends Paid Per Share on Preferred		Dividends Paid Per Share on Common	Dividends Paid Per Share on Common	Num
	1946	1945	1946	1945	1946	1945	1946	1945	1946
United States Steel Corp.	$25,219,677	$25,219,677	$ 7.29	$3.76	$7.00	$7.00	$4.00	$4.00	266,83
Bethlehem Steel Corp.	6,537,209	6,537,209	11.79	9.52	7.00	7.00	6.00	6.00	145,46
Republic Steel Corp.	1,692,858	1,832 817	2.53	1.36	None‡§	3.00‡§	1.00	1.00	60,13
Jones & Laughlin Steel Corp.	1,649,244	2,886,204	3.79	2.91	5.00	5.00	2.00	2.00	39,15
Youngstown Sheet & Tube Co.	None	None	8.51	4.12	None	4.12	3.00	2.00	24,59
National Steel Corp.	None	None	9.17	5.04	None	None	3.25	3.00	25,00
Inland Steel Co.	None	None	3.18	6.04	None	None	1.83	4.50	20,37
American Rolling Mill Co.	1,227.936	2,024,736	5.35	2.58*†	4.50	4.50	1.25	0.80	27,13
Wheeling Steel Corp.	1,815,830	1,815,830	6.25	3.75	5.00	5.00	1.50	1.50	14,92
Crucible Steel Co. of America	1,578,105	1,583,505	2.36*	7.26	5.00	5.00	None	2.00	16,40
Colorado Fuel & Iron Corp.*§	303,375	None	0.56*	3.47	0.60	None	0.45	1.00	12,83
Pittsburgh Steel Co.	863,988	863,762	1.61*	3.09*	5.50§§	5.50§§	None	None	9,10
Lukens Steel Co.	None	None	0.00	8.65	None	None	None	0.35	4,68
Granite City Steel Co.§†	None	None	1.26*	0.18	None	None	0.05	0.17	1,35
Sharon Steel Corp.	149,150†#	298,600	4.39‡*	1.86	2.50†#	5.00	1.30	1.00	7,76
Alan Wood Steel Co.	502,768	502,768	1.46	0.98*	3.50	3.25	None	None	3,01
Midvale Co.	None	None	3.10*	3.01	None	None	2.00	2.00	3,05
Allegheny Ludlum Steel Corp.	None	None	5.12	2.68	None	None	2.00	2.00	12,63
Continental Steel Corp.	None	None	1.89	1.22††	None	None	0.80	0.80††	3,36
Laclede Steel Co.	None	None	3.27	1.55	None	None	1.00	1.30	2,13
Keystone Steel & Wire Co.	None	None	4.46	2.14	None	None	2.85	1.40	2,03
Follansbee Steel Corp. †*	None	127,395	4.57	0.86	None	None	0.50	None	2,29
A. M. Byers Co.‡#	382,967	390,651	0.88*	2.51	7.00	7.00	None	0.50	NA
Harrisburg Steel Corp.§‡	None	None	0.78	1.61	None	None	1.00	1.10	1,51
Northwestern Steel & Wire Co.	5,250	5,250	3.74	1.29	7.00	7.00	1.00	None	1,44
Total (or average)	$41,928,357	$44,088,404	$5.08	$3.62	....	....	....	....	707,16

NA=Not available.
†Split in 1946 to 2½ for 1.
‡‡Adjusted for 2½-for-1 split.
Net credit after refunds, adjustments, and current year taxes.
§Estimated refund based on carry-back.
*Deficit.
##Refund.
†*Comparison of company's earnings with steel ingot capacity or output would be misleading as company purchases all hot strip used in manufacture of cold-reduced coils, sheet, strip and seamless roofing.
**Claims for refund.
*‡Based on net income in 1945 before extraordinary and non-recurring adjustments.
§‡Company's operations were affected by 7-months' strike in 1946.
§§Payment on prior preferred; no payments either year on class A or B preferred.
‡‡Excludes deposit and offsetting liability of $35,000,000 under escrow agreement against payment to be made on or before June 19, 1948 in connection with purchase of government properties.
‡*Does not include addition of $600,000 from reserve for contingencies.
†#Dividends paid on preferred stock represent requirements for one-half year. Preferred stock redeemed July 1, 1946.
#*Based on inclusion of 844,200 net tons ingot capacity of Farrell plant acquired Dec. 15, 1945.
§*Does not include 844,200 net tons ingot capacity of Farrell plant acquired Dec. 15, 1945.
#†After elimination of excess funded debt charges due to refinancing.

Financial Analysis of the Steel

In making interpretations from this analysis, the following should be kept in mind: Carry-back provisions on federal taxes, renegotiati

Official Returns from Twenty-Five Producers, Representing 88.38 P

red Stock nation 945	Funded Debt 1946	Funded Debt 1945	Surplus 1946	Surplus 1945	Total Capitalization 1946	Total Capitalization 1945	Capitalizatio Per Ton Ingot Ca 1946
281,100	$ 81,197,155	$ 78,638,831	$441,548,781	$412,958,991	$1,535,770,936	$1,504,622,822	$52.06
388,700	125,814,000	120,881,970	162,040,766	144,756,008	664,817,896	642,601,108	51.54
214,300	61,440,000	65,750,000	116,508,027	107,782,019	336,471,468	335,555,460	37.81
358,200	28,154,412	28,198,529	80,527,906	76,059,261	234,546,518	230,180,390	49.47
None *‡	30,000,000	36,060,270	64,213,101	54,983,220	199,301,154	196,131,543	49.80
None	40,000,000	40,000,000	126,148,236	112,555,821	221,194,286	207,718,121	56.72
None	57,000,000	30,907,000	65,162,473	59,600,429	184,662,473	153,007,429	54.31
993,000	38,500,000	14,000,000	89,473,382	77,558,346	180,379,536	168,964,499	55.06
316,600	23,500,000	27,750,000	28,142,265	27,452,045	116,436,815	119,996,595	70.48
328,300	25,000,000	12,217,000	25,336,193	26,961,867	92,810,142	81,924,610	72.89
None	9,500,000	10,250,000	32,009,281	24,043,426	57,200,791	39,929,626	41.08
392,580	6,988,000	7,476,000	18,321,499	18,677,344	46,609,909	47,408,114	43.48
None	600,000	800,000	10,553,662	10,553,011	14,333,422	14,532,771	22.97
None	3,000,000	None	4,263,271	4,764,091	15,747,092	13,247,913	39.06
372,000	4,500,000	5,000,000	18,274,324	10,337,185	29,007,134	25,283,715	19.34
182,433	None	None	4,723,240	4,180,683	16,294,562	15,752,005	29.63
None	None	None	9,264,660	9,090,056	19,839,281	19,664,677	NA
None	None	None	28,242,396	23,890,294	36,294,183	31,785,206	78.84
None	None	None	5,327,460	6,525,838	12,346,723	11,802,081	33.92
None	2,500,000	750,000	2,234,433	2,168,504	8,859,433	7,043,504	27.17
None	None	None	10,454,962	9,267,443	13,611,762	12,424,243	45.01
547,913	1,838,400	None	5,391,593	4,289,269	9,900,633	9,014,243	70.16
566,500	None	None	9,349,064	9,591,680	17,311,222	17,681,238	115.40
None	None	None	2,881,280	2,748,346	3,797,780	3,664,846	37.70
75,000	None	None	3,540,652	3,092,830	4,433,477	3,985,655	13.81
16,626	$539,531,967	$478,679,600	$1,363,932,907	$1,243,888,007	$4,071,978,628	$3,913,922,414	$50.24

Paid Per Common	Average Number Employed 1946	Average Number Employed 1945	Total Payrolls 1946	Total Payrolls 1945	Rated Ingot Capacity Net Tons 1946	Rated Ingot Capacity Net Tons 1945	Ingot Production Net Tons 1946	Ingot Production Net Tons 1945	Steel Operating Rate Per Cent 1946	Steel Operating Rate Per Cent 1945
)	266,835	279,274	$694,258,238	$786,721,918	29,500,000	28,800,000	21,287,000	26,479,000	72.90	82.00
)	145,461	203,516	385,475,861	625,887,729	12,900,000	12,900,000	10,012,480	11,831,610	77.60	91.70
)	60,136	56,624	160,358,889	169,212,896	8,600,000	8,900,000	6,260,047	7,545,825	70.30	79.20
)	39,152	37,626	104,288,808	111,200,254	4,741,500	5,024,400	3,806,839	4,421,112	80.00	88.00
)	24,593	21,922	65,546,635	68,869,225	4,002,000	4,002,000	3,242,135	3,754,434	81.00	93.80
)	25,006	22,821	75,190,951	72,812,293	3,900,000	3,900,000	NA	NA	NA	NA
)	20,374	19,336	59,528,916	59,929,238	3,400,000	3,400,000	2,811,003	3,507,686	82.70	103.20
)	27,138	24,207	74,896,811	70,868,905	3,276,000	3,237,000	2,738,009	2,992,020	83.60	92.40
)	14,928	18,326	44,725,781	54,132,892	1,344,000	1,960,000	1,264,414	1,876,906	76.54	95.76
)	16,403	20,706	43,400,000	61,600,000	1,273,350	1,392,660	NA	NA	NA	NA
	12,837	9,253	27,500,312	24,602,007	1,392,420	1,268,640	1,072,242	1,225,406	77.01	98.96
)	9,100	7,700	24,850,918	22,563,460	1,072,000	1,072,000	838,219	809,272	78.19	75.49
	4,687	5,175	12,198,836	15,801,235	624,000	624,000	497,621	644,453	79.74	103.27
	1,356	2,126	3,182,215	5,914,229	403,200	578,200	155,786	392,351	38.60	67.90
	7,765	6,069	17,985,087	13,015,262	1,500,000	636,000§*	874,190	•582,126	59.00	91.50
)	3,018	2,719	7,820,975	8,061,988	550,000	550,000	348,378	444,488	63.34	80.82
	3,052	6,350	9,619,678	17,981,141	NA	NA	77,067	179,123	NA	NA
	12,639	11,616	35,764,589	34,663,373	460,360	460,360	367,408	381,600	79.81	82.89
†‡	3,360	2,920	8,266,785	8,125,878	364,000	364,000	293,527	354,380	80.60	97.40
	2,136	1,606	5,506,979	4,331,618	326,025	326,025	275,002	271,952	84.30	83.40
	2,035	1,728	6,790,294	6,199,077	302,400	302,400	285,148	283,643	94.30	93.80
)	2,299	2,068	5,076,512	5,210,807	141,120	141,120	NA	NA	NA	NA
	NA	NA	5,678,817	6,531,289	150,000	150,000	NA	NA	NA	NA
	1,519	4,040	3,611,071	9,976,506	100,750	100,750	48,081	75,276	47.70	74.70
)	1,440	1,200	4,196,564	3,330,633	321,000	321,000	225,019	240,604	70.10	75.00
	707,169	768,928	$1,885,720,522	$2,267,543,853	80,644,125	80,410,555	56,779,615	68,293,267	75.42	91.02

§Dividends paid per share on prior preference stock were $6 in 1946 and $6 in 1945.
*Fiscal year ended June 30.
‡Figures for 1945 included a war plant abandoned that year.
†Preferred stock retired Oct. 1, 1945.
#Fiscal year ended Sept. 30.

"Net Income Before Dividends" columns and totals do not take into consideration requirements (not actual payments) for preferred dividends. In computing earnings per common share these totals, adjusted for preferred dividend requirements, are used. In arriving at earnings per common share for individual companies the same method is followed.

Boldface type is used under those columns in which figures from all 25 companies were not available.

PER CENT EARNED ON CAPITALIZATI

1928	6.55	1934	0.36
1929	9.88	1935	2.09
1930	4.54	1936	4.40
1931	0.40	1937	6.07
1932	•2.85	1938	0.59
1933	•0.90	1939	4.27
*Loss.		1940	7.57

the Steel Industry for 1946

ck provisions on federal taxes, renegotiation, reductions in reserve for contingencies, and accelerated depreciation.

rs, Representing 88.38 Per Cent of Steelmaking Capacity

alization	Capitalization Per Ton Ingot Capacity		Charges to Contingency Fund for Strikes & Unusual Costs		Total Income Before Dividends and Interest on Bonds		Per Cent Total Income On Capitalization		
1945	1946	1945	1946	1945	1946	1945	1946	1945	
$1,504,622,822	$52.06	$52.24	$29,212,714	$38,184,952	$93,399,610	$61,515,709	6.08	4.09	$1,496
642,601,108	51.54	49.81	11,000,000	None	44,285,989	49,232,667	6.66	7.66	787
335,555,460	37.81	36.16	3,100,000	None	17,796,737	13,358,587#‡	5.29	3.98	412
230,180,390	49.47	45.81	4,000,000	1,643,075	11,799,352	9,063,600	5.03	3.94	246
196,131,543	49.80	49.01	None	None	15,130,530	10,455,762	7.59	5.33	218
207,718,121	56.72	53.26	None	None	21,718,795	13,510,900	9.82	6.50	239
153,007,429	54.31	45.00	None	None	17,608,287	11,352,803	9.53	7.42	217
168,964,499	55.06	52.20	None	None	19,380,678	10,501,039*†	10.74	6.21*†	231
119,996,595	70.48	61.22	None	None	6,195,109	4,966,882	5.32	4.14	110
81,924,610	72.89	58.83	None	None	1,040,820	5,243,724	1.12	6.40	88
39,929,626	41.08	31.47	None	None	49,229*	2,454,078	0.08*	6.32	58
47,408,114	43.48	44.22	None	None	441,320	258,361*	0.95	0.54*	54
14,532,771	22.97	23.29	None	None	651	2,791,937	0.00	19.21	30
13,247,913	39.06	32.86	None	None	424,940*	152,945	2.70*	1.15	8
25,283,715	19.34	17.08#*	None	None	2,999,615†*	1,074,766	10.34‡*	4.25	55
15,752,005	29.63	28.64	None	None	793,941	307,738	4.87	1.95	25
19,664,677	NA	NA	None	None	1,861,284*	1,805,895	9.38*	9.18	
31,785,206	78.84	69.04	None	None	6,599,346	3,379,369	18.18	10.63	95
11,802,081	33.92	32.42	None	None	946,119	627,460	7.66	5.32	24
7,043,504	27.17	21.60	None	None	710,429	333,750	8.00	4.70	17
12,424,243	45.01	41.09	None	None	3,379,018	1,623,223	24.83	13.06	23
9,014,243	70.16	63.88	None	None	1,261,999	313,572	12.75	3.48	17
17,681,238	115.40	117.87	None	None	149,530	1,055,126	0.86	5.97	13
3,664,846	37.70	36.38	None	None	142,469	295,792	3.75	8.07	6
3,985,655	13.81	12.42	None	None	616,638	234,269	13.91	5.88	12
$3,913,922,414	$50.24	$48.42	$47,312,714	$39,828,027	$264,061,529	$205,393,232	6.48	5.24	$4,491

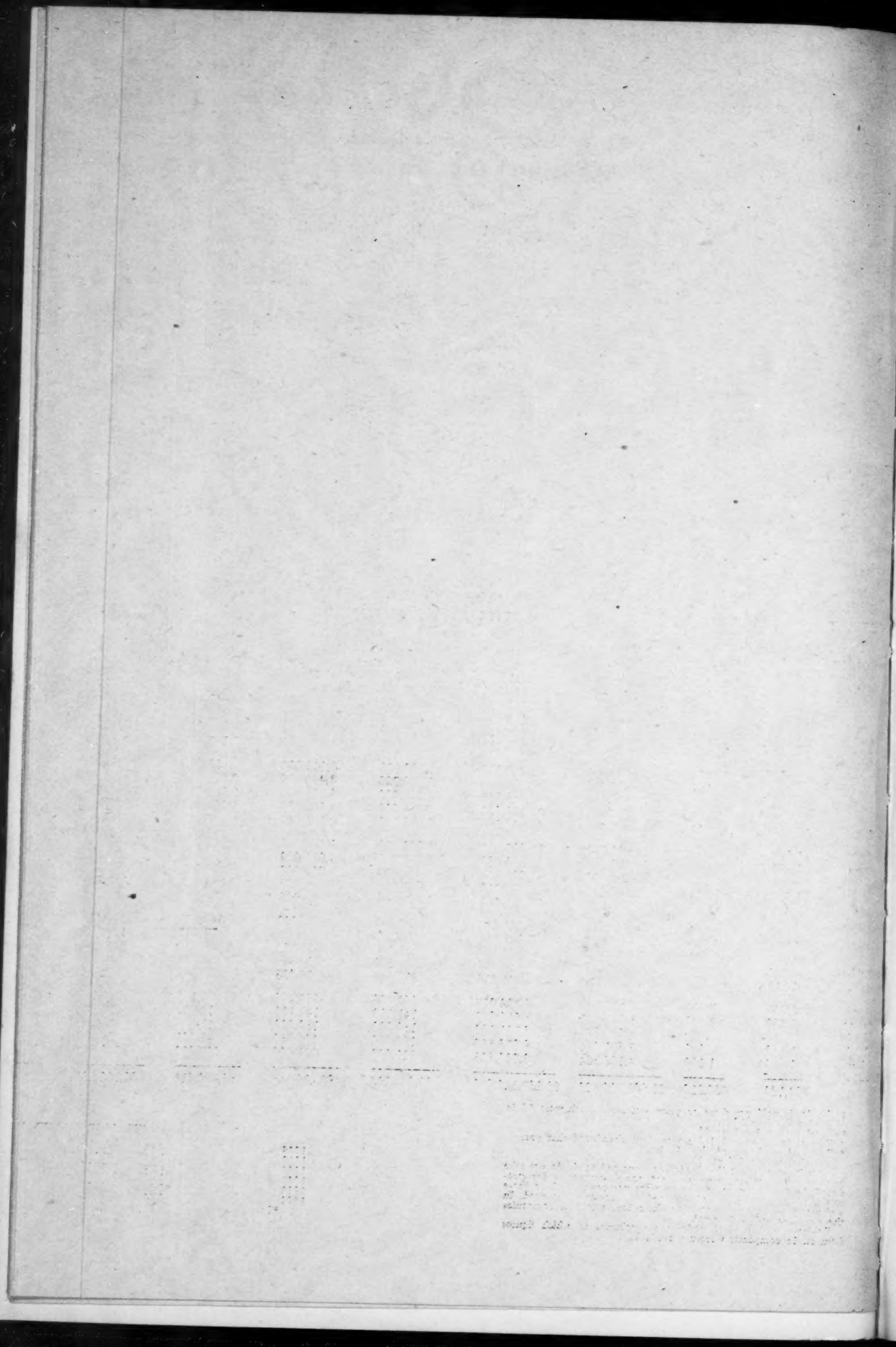
Production Net Tons	Steel Operating Rate Per Cent		Net Income Per Ton Ingots Produced		Net Income Per Ton Ingot Capacity		Federal Income Taxes		Total Assets		
1945	1946	1945	1946	1945	1946	1945	1946	1945	1946	1945	
26,479,000	72.90	82.00	$4.16	$2.19	$3.00	$2.01	$32,000,000	$30,000,000	$2,003,517,407‡‡	$1,890,768,775	$9
11,831,610	77.60	91.70	4.17	2.95	3.24	2.71	15,500,000	12,200,000	867,666,922	880,879,749	
7,545,825	70.30	79.20	2.56	1.26	1.80	1.03	9,000,000	15,952,608	405,398,232	398,157,355	
4,421,112	80.00	88.00	2.85	1.83	2.29	1.61	4,560,000	3,367,000#	280,768,397	276,076,828	
3,754,434	81.00	93.80	4.40	2.00	3.56	1.88	9,275,000	6,500,000	234,642,650	230,793,828	
NA	NA	NA	NA	NA	5.25	2.85	13,875,000	16,000,000	281,199,450	249,873,625	
3,507,686	82.70	103.20	5.53	2.81	4.58	2.90	8,998,150	8,245,208	214,795,853	182,046,097	
2,992,020	83.60	92.40	6.78	3.15*†	5.66	2.91*†	13,861,244	10,424,740*†	227,149,526	206,968,842	
1,876,906	76.54	95.76	4.25	2.10	3.25	2.02	2,082,000	3,405,445	128,809,454	133,139,501	
NA	NA	NA	NA	NA	0.41	3.46	1,505,024**	None	107,999,288	95,210,596	
1,225,406	77.01	98.96	0.31*	1.56	0.24*	1.54	400,000	1,516,400	73,406,208	53,371,685	
809,272	78.19	75.49	0.06	0.88*	0.04	0.66*	None	4,280,000##	55,341,718	55,419,029	
644,453	79.74	103.27	0.00	4.27	0.00	4.41	270,898#	2,410,000§	18,869,145	21,028,453	
392,351	38.60	67.90	3.09*	0.17	1.19*	0.12	None	75,000	19,992,856	15,660,426	
582,126	59.00	91.50	3.27	1.77	1.91	1.62	1,675,000	2,480,700	39,689,672	32,414,183	
444,488	63.34	80.82	2.28	0.69	1.44	0.56	350,282	195,857##	19,954,848	18,410,456	
179,123	NA	NA	24.15*	10.08	NA	NA	None	1,600,000	24,875,812	25,936,909	
381,600	79.81	82.89	17.96	8.86	14.34	7.34	5,031,152	7,851,096	51,413,221	43,006,707	
354,380	80.60	97.40	3.22	1.73	2.60	1.68	900,000	495,000	15,976,344	14,579,075	
271,952	84.30	83.40	2.46	1.18	2.07	0.98	474,500	195,000	11,250,784	8,157,137	
283,643	94.30	93.80	11.85	5.72	11.17	5.37	2,704,895	2,514,000	14,921,805	13,254,122	
NA	NA	NA	NA	NA	NA	NA	716,000	191,286	12,293,051	10,374,673	
NA	NA	NA	NA	NA	0.99	7.03	600,000**	826,000**	19,223,284	20,636,719	
75,276	47.70	74.70	2.96	3.93	1.41	2.94	None	788,943	4,445,647	5,141,343	
240,604	70.10	75.00	2.74	0.90	1.92	0.67	553,009	452,000	6,084,924	5,714,700	
68,293,267	75.42	91.02	$3.95	$2.27	$3.08	$2.12	$119,580,310	$109,808,569	$5,139,686,498	$4,887,020,813	$2,5

PER CENT EARNED ON CAPITALIZATION

55	1934	0.36	1941	7.87
88	1935	2.09	1942	5.69
54	1936	4.40	1943	5.22
40	1937	6.07	1944	5.02
85	1938	0.59	1945	5.24
90	1939	4.27	1946	6.48
	1940	7.57		

Net Sales		Net Profit Margin Per Cent		Net Income Before Dividends		
1946	1945	1946	1945	1946	1945	
$1,496,064,326	$1,747,338,661	5.92	3.32	$88,622,475	$58,015,056	United States Steel Corp.
787,720,668	1,326,563,896	5.30	2.63	41,731,931	34,947,116	Bethlehem Steel Corp.
412,755,542	497,675,322	3.88	1.92	16,033,469	9,543,443	Republic Steel Corp.
246,297,831	284,741,818	4.41	2.84	10,854,084	8,082,082	Jones & Laughlin Steel Corp.
218,495,688	233,503,661	6.59	3.26	14,254,905	7,512,250	Youngstown Sheet & Tube Co.
239,764,320	271,832,560	8.53	4.09	20,461,651	11,117,764	National Steel Corp.
217,739,493	217,386,432	7.14	4.54	15,556,897	9,861,210	Inland Steel Co.
°† 231,930,811	220,144,648	8.00	4.28°†	18,552,491	9,414,647°†	American Rolling Mill Co.
110,397,692	143,154,065	4.87	2.76	5,372,910	3,950,252	Wheeling Steel Corp.
88,417,091	141,613,117	0.60	3.39	527,417	4,813,387	Crucible Steel Co. of America
58,118,237	57,171,800	0.57°	3.42	334,751°	1,954,979	°§Colorado Fuel & Iron Corp.
° 54,194,854	53,604,417	0.09	1.32°	46,635	709,442°	Pittsburgh Steel Co.
30,289,067	45,243,988	0.00	6.08	651	2,751,478	Lukens Steel Co.
8,567,977	18,877,955	5.62°	0.36	481,696°	68,288	§†Granite City Steel Co.
55,021,144	40,803,078	5.19‡°	2.52	2,857,856‡°	1,029,074	Sharon Steel Corp.
25,263,991	26,057,554	3.14	1.18	793,941	307,738	Alan Wood Steel Co.
NA	NA	NA	NA	1,861,284°	1,805,895	Midvale Co.
95,277,573	100,401,059	6.93	3.37	6,599,346	3,379,369	Allegheny Ludlum Steel Corp.
24,330,784	23,564,277	3.89	2.60	946,119	612,543	Continental Steel Corp.
17,140,184	15,158,127	3.90	2.10	675,304	320,312	Laclede Steel Co.
23,610,560	21,169,892	14.31	7.67	3,379,018	1,623,223	Keystone Steel & Wire Co.
17,419,825	16,474,696	7.01	1.90	1,220,635	313,572	†°Follansbee Steel Corp.
13,899,650	18,232,364	1.07	5.79	149,530	1,055,126	‡#A. M. Byers Co.
6,058,876	23,529,446	2.35	1.26	142,469	295,792	§†Harrisburg Steel Corp.
12,753,240	12,770,496	4.84	1.69	616,638	216,313	Northwestern Steel & Wire Co.
$4,491,529,424	$5,557,013,329	5.53	3.06	$246,718,641	$172,281,467	Total (or average)

Current Assets		Current Liabilities		Ratio of Current Assets To Current Liabilities		
1946	1945	1946	1945	1946	1945	
3,775 $954,639,288	$817,760,584	$325,560,350	$217,000,332	2.93—1	3.77—1	United States Steel Corp.
9,749 458,545,860	514,150,099	150,365,104	174,806,320	3.05—1	2.94—1	Bethlehem Steel Corp.
7,355 183,905,259	189,218,793	55,534,575	49,216,791	3.31—1	3.84—1	Republic Steel Corp.
3,828 122,188,413	124,188,198	39,200,442	34,917,181	3.12—1	3.56—1	Jones & Laughlin Steel Corp.
3,828 132,822,278	123,588,007	23,006,476	22,698,582	5.77—1	5.44—1	Youngstown Sheet & Tube Co.
3,625 117,500,096	105,085,479	41,080,816	26,219,652	2.90—1	4.00—1	National Steel Corp.
3,097 117,833,865	102,312,148	18,971,747	18,649,582	6.20—1	5.50—1	Inland Steel Co.
3,842 122,732,526	111,864,958	40,154,736	32,010,453	3.06—1	3.49—1	American Rolling Mill Co.
9,501 59,050,739	62,603,100	10,823,524	11,410,520	5.46—1	5.49—1	Wheeling Steel Corp.
0,596 46,547,372	61,467,376	12,399,346	10,493,249	3.75—1	5.86—1	Crucible Steel Co. of America
,685 30,244,316	23,107,541	11,954,106	9,482,577	2.53—1	2.43—1	°§Colorado Fuel & Iron Corp.
9,029 28,541,976	28,119,800	7,820,458	7,031,618	3.65—1	4.00—1	Pittsburgh Steel Co.
3,453 10,790,383	12,480,929	3,478,408	4,910,406	3.10—1	2.54—1	Lukens Steel Co.
9,426 8,458,736	6,591,032	3,820,871	2,124,299	2.21—1	3.10—1	§†Granite City Steel Co.
3,183 25,721,606	19,662,207	10,317,538	5,877,952	2.49—1	3.35—1	Sharon Steel Corp.
9,456 10,129,253	9,425,037	3,158,231	2,118,821	3.21—1	4.45—1	Alan Wood Steel Co.
3,909 18,566,399	19,644,372	1,335,126	2,454,623	13.90—1	8.00—1	Midvale Co.
3,707 35,982,038	31,008,715	13,929,254	10,029,382	2.58—1	3.09—1	Allegheny Ludlum Steel Corp.
9,075 9,986,222	7,416,775	2,203,421	1,627,808	4.50—1	4.60—1	Continental Steel Corp.
7,137 6,707,554	4,312,027	1,696,351	818,633	3.95—1	5.27—1	Laclede Steel Co.
4,122 7,008,956	6,046,000	1,131,397	670,242	6.19—1	9.02—1	Keystone Steel & Wire Co.
4,673 6,864,245	4,567,911	2,271,675	1,571,633	3.02—1	2.91—1	†°Follansbee Steel Corp.
3,719 6,981,181	8,122,174	1,664,128	2,698,845	4.19—1	3.00—1	‡#A. M. Byers Co.
1,343 2,106,081	3,306,940	647,867	1,276,497	3.25—1	2.59—1	§†Harrisburg Steel Corp.
4,700 2,621,162	2,434,015	1,193,185	1,226,354	2.20—1	2.00—1	Northwestern Steel & Wire Co.
0,813 $2,526,475,804	$2,398,484,217	$783,719,132	$651,342,352	3.22—1	3.68—1	Total (or average)



Building Boom Seen Probable On West Coast

Demand for structural and reinforcing steel products expected to reach record high level in next five years

SAN FRANCISCO

EXPANDED markets for structural and reinforcing steel products are foreseen on the West Coast during the next few years. Stemming from the fact that a huge backlog of private industrial and public works construction has been pentup by the war, present construction plans during the next five years or longer, if fulfilled, will produce a boom larger than the building industry on the Coast has ever experienced.

Millions of dollars of new factories, offices and store buildings and other industrial and commercial structures have been projected up and down the Coast. These projects will provide the biggest outlet for structural steel items and a large market for reinforcing steel.

In addition, federal and state public works programs in the form of new hydroelectric dams, irrigation projects and the like provide further backlogs of orders for reinforced steel products.

Big Highway Projects Planned

Big state highway programs throughout the West also are being prepared. Some are of unprecedented size, and regardless of how political storms blow, it appears certain over the next few years highways will have to be repaired, widened and extended. These programs currently are producing the largest single source of demand for reinforcing steel.

That these markets will continue large for some time to come appears assured by the huge growth of the West Coast's population during the war years. California alone has gained well over 2 million people since 1940. This increased population creates new markets and, basically, creates the need for new construction to serve those markets.

Automobile registrations in California now are the highest in history, creating a demand for more and better highways. Demand for electricity in some areas is exceeding supply, creating demand for new electric-generating projects.

At the moment, however, new construction of many kinds is hampered by several factors: Materials in many instances are scarce to the point where new buildings have to be halted or cannot be started; costs are high, prohibitively high frequently both for labor and materials. The result is that building at present cost levels is so uneconomical much is being postponed. Government restrictions, too, still bar many projects.

Construction men, nevertheless, are confident once some or all of these hampering influences are removed building volume will jump to a high level where it will remain for many months.

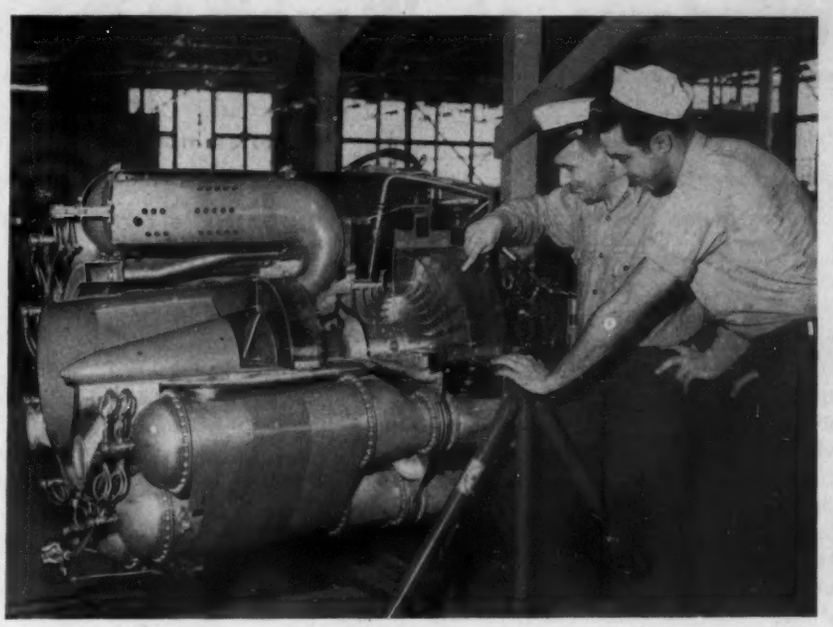
With respect to supply of structural and reinforcing steel, prospects are improving. That is especially true of reinforcing steel products. Deliveries are increasing and inventories are becoming better adjusted. This trend partly results from the fact the West's capacity for producing such items is large in comparison with its entire rolling mill capacity.

As a sidelight in the construction steel picture on the West Coast, Soule Steel Co. has plans to begin production of prefabricated steel buildings. The company, which is a leading fabricator, announced it will begin mass production of steel industrial and farm buildings early in May.

The company, which has been experimenting with this type building for seven years, plans to expand its San Francisco plant for construction of the buildings. It also operates plants in Los Angeles and Portland, Oreg.

The new type buildings will have walls and roofs made of Plasteel, which is steel coated with plastic and mica developed by Soule engineers. The material, it is said, withstands corrosion and makes periodic painting unnecessary.

The buildings will be produced and shipped in sections to sites where they can be assembled quickly by inexperienced workers, the company said. All parts of the structures except floors and foundations will be produced by the Soule company.



JET REPAIR STATION: The Alameda (Calif.) Naval Air Station boasts the first jet repair and training center in the country. Above, instructor tells student about the 1-16-6 turbo-jet, cutaway model of which is shown, used in the Ryan Fireball. NEA photo

Kaiser Mills, Mine Set Record Highs in March

Production of steel ingots at the Kaiser Fontana, Calif., steelworks established a new record high during March, when 64,454 tons were produced. According to A. B. Ordway, vice president and general manager, the March volume exceeds slightly the previous high of 64,271 tons produced in January.

Output of the Fontana mill has been rising steadily and now is well above wartime peak production levels. Best mark during the war was reached in March, 1945, when 61,979 tons of ingots were produced.

Mr. Ordway also reported new records in March for the merchant and structural mills. Merchant mill tonnage was 16,060, compared with the previous high of 15,307 tons in February, and output of structural items was 28,075 tons against the January high of 24,007.

The company's iron ore mine at Vulcan produced 93,228 tons in March, compared with the best previous output of 77,114 tons in June, 1944.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Federal Trade Commission policy in enforcing antitrust laws under scrutiny by House Appropriations Committee. Commission has been slow to change to industry conferences and fair trade practice codes favored by Congress and Administration

FEDERAL Trade Commission procedure in enforcing the antitrust laws is the subject of a controversy before the House Appropriations Committee, in the outcome of which business is vitally interested. Specifically the issue is whether the government will continue the practice of pouncing on a few companies here and there for antitrust law violations or whether it will change over to a policy of inviting and encouraging compliance through industry conferences.

Last year Congress gave the FTC $350,000 to be spent in trade practice work. Whole industries were to be called to Washington to co-operate with the commission in writing fair trade practice codes. As President Truman put it in his message to Congress, the commission was to "increase its effectiveness by operating on an industry-wide basis, rather than through the slower procedure of individual complaints" and that it was to "sponsor a larger number of industry conferences designed to locate and eliminate unfair trade practices through co-operative action."

Plan Hasn't Worked as Intended

The plan has not worked out as intended by the President and the Congress. Now the House Appropriations Committee, before reaching a decision on a request for $4 million to be spent on trade practice work during the fiscal year ending June 30, 1948, wants an assurance that the commission will mend its ways. The problem is in the hands of a subcommittee headed by Rep. Richard B. Wigglesworth (Rep., Mass.).

Failure to adopt the new policy has been due to an under-cover split among the commissioners. The nature of the disagreement was revealed publicly for the first time on Apr. 11 when one of the commissioners, Lowell B. Mason, made a speech at the Kansas University Law School, Lawrence, Kans. Mr. Mason, a member of a minority which favors the change, bluntly accused the commission of "fiddling." Only in one small area— that involving false and misleading advertising—does the commission now recognize trade practice rules as a substitute for trial prosecutions, said Mr. Mason.

Principal reason why the commission shies away from the use of the trade practice conference to eliminate practices is the fear "that rules cannot be drawn with enough clarity and particularity to fit the problems of each industry." This fear Mr. Mason does not share. Ironically he expressed the opinion that the commission should be able to draw up rules "as explicit as some of its recent decisions."

"Maybe," he went on, "when we have the benefit of sane advice and practical suggestions from a whole industry in a co-operative conference, instead of the legalistic forensics of paid advocates in a single litigation, we will be able to decrease the confusion and uncertainty of today."

The White House view of what is wrong with the present Federal Trade Commission procedure is as follows:

1—The present policy of bringing action against individuals and single corporations does not invite compliance. The chances of picking on any certain individual or corporation are on the order of the chances of being struck by lightning. The odds are so one-sided that business men are willing to take a chance on being tagged.

2—Cease and desist orders, issued after lengthy and costly trials, place the respondent company under a handicap not imposed on the remainder of an industry; such orders fail to bring protection to the public if the banned practice—and this usually is the case—is common to other companies in the same line of business.

3—The present lack of a clear-cut policy invites noncompliance. Every business man engaged in interstate commerce knows that the Federal Trade Commission, if it sets out to prosecute him, can put its finger on some violation on which it can base an order. Hence the average businessman's viewpoint: What is the use of trying to be good?

The White House continues to show an interest in removing or amending government procedures that now hamper private business. A study recently begun is expected to result in a program of recommedations to Congress, possibly to be incorporated in the President's economic report to Congress in January of 1948. One of the White House ideas, for example, is that business men are entitled to know beforehand whether a contemplated action would be illegal. The Department of Justice might be empowered to inform industry in advance whether, in the event a contemplated action is taken, antitrust proceedings would be instituted.

This point came up on Apr. 10 during a conference on the quarterly report of Dr. E. G. Nourse, chairman of the President's Council of Economic Advisers. In view of the White House preoccupation over the recent inflationary price trend, this question was asked: Can members of an industry get together and legally agree on a price reduction? Attorney General Clark was asked to study this question and submit a report.

See Cheaper Synthetic Fuel

Indications are that costs of producing synthetic liquid fuels will be considerably lower than previously anticipated, according to a report of the Secretary of the Interior to Congress,

"It is estimated," says the report, "that gasoline can be produced from natural gas for 5½ to 7 cents per gallon, and from coal or oil shale for 7½ to 9½ cents per gallon. These figures are only a few cents higher than the present estimated cost of gasoline from petroleum. At the present rate of progress, synthetic production of petroleum products on a commercial basis is possible within a few years."

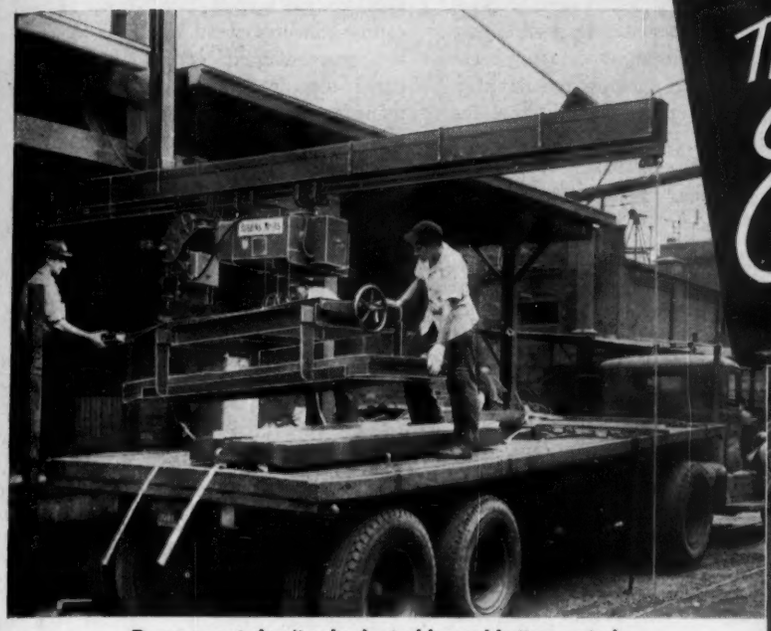
Secretary Krug says the need for a commercial synthetic liquid fuel industry is imperative for three reasons. First, the nation's peacetime demand for crude oil is approaching the wartime peak. Second, the cost of discovering additional reserves of natural crude oil is rising rapidly. Third, it might be unsafe to rely for increasing needs upon reserves to be discovered.

Another angle to the development of synthetic liquid fuel is noted by Mr. Krug. "The replacement by synthetic processes of any large segment of production from natural crude will require many years of conversion and construction. The work prerequisite to such replacement should not wait until the need arises. Therefore, the development work being done by the Bureau of Mines (under the Synthetic Liquid Fuel Act of 1944) should continue to be given every encouragement and aid."

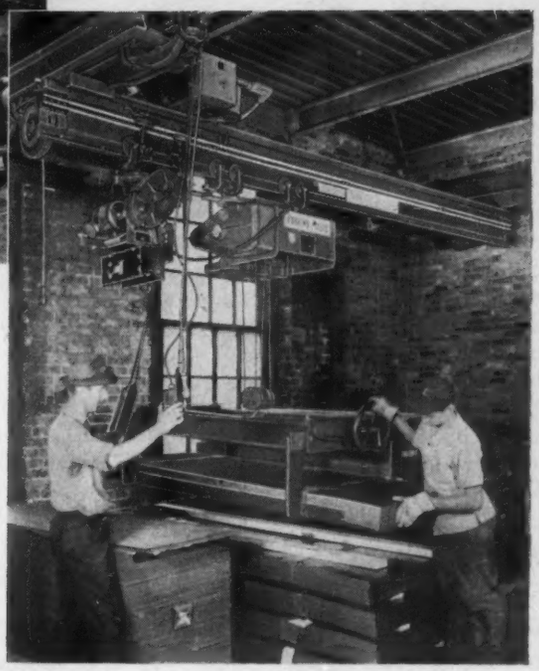
Work to date has shown that a full range of synthetic fuels can be produced —from the paraffinic grades suitable for diesel engines, to the isocompounds

HANDLING STEEL

The Easy Way!

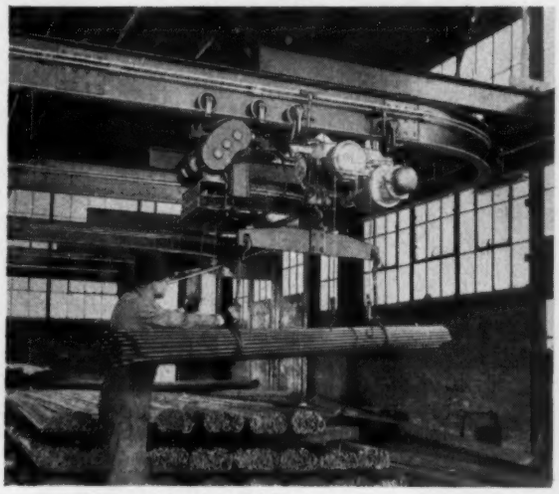


Power operated unit unloads steel by pushbutton control



Electric hoist with special hook, handles coils to process.

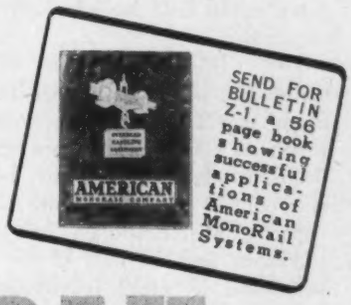
Power crane accurately spots 2-ton loads.



MonoTractor and 3-Ton hoist moves bar stock.

This tough job is made easy from start to finish —unloading stock from truck, to storage, to machines, to shipping—American MonoRail Systems, to fit any budget, afford faster handling, accurate spotting, reduced fatigue, added safety and greatly reduced damage.

American MonoRail Equipment saves one company $20 on every truck unloaded; another saved $150 in the first four months. With thousands of installations to draw from, American MonoRail Engineers are well qualified to offer solutions involving overhead handling equipment. This service is offered without obligation.



THE AMERICAN MONORAIL COMPANY

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and aromatics suitable for high-octane aviation fuel. Principal effort now is on reducing the investment and overhead costs—either by lowering the cost of the equipment or by increasing the output so as to get lower unit costs. Other major studies are aimed at rapid removal of the large amount of heat that is generated in the hydrogenation process, and at discovery of the best catalysts.

Much more information will result from operation of the hydrogenation demonstration plant at Louisiana, Mo. This will have capacity to produce 200 gallons of gasoline or oil per day from coal.

Work with oil shale so far has been preliminary, as determining specific heats of selected samples, experimenting with various solvents and temperatures. A number of engineering and technical difficulties remain to be solved. One of the difficulties is that oil shale is found in mountainous, thinly populated areas in the west—thus creating road-building, housing, water and many other problems.

Another important branch of the program, that involving production of alcohol from agricultural residues, was started last September when a pilot plant was placed in operation at Peoria, Ill., by the Department of Agriculture's Bureau of Agricultural and Industrial Chemistry. Several liquid fuels have been produced and are being studied.

Mergers Increase Sharply

Since 1940, more than 1800 formerly independent companies in manufacturing and mining industries have disappeared as the result of mergers and other consolidations, according to a study by the Federal Trade Commission. The FTC has pending a request for Congressional amendment to the antitrust laws to give the commission greater powers to pass on mergers.

The merger movement has been particularly active since V-J Day, the FTC report says, and parallels closely a trend noted after World War I.

From 1940 through 1946, the commission reported 120 companies in the primary metals field have been merged or acquired.

The FTC stressed particularly the consolidations in heavy steel barrel and drum manufacture. Seven major steel producers now control 87 per cent of the drum manufacturing capacity; before the war, only 10 per cent of drum fabricating capacity was controlled by the steel producers and the bulk of the business was done by small independent companies.

Two bills now pending before Congress are designed to give the FTC increased authority in permitting or denying mergers. They are the Kefauver and O'Mahoney bills. The latter differs from the former largely in that it requires the parties to a contemplated merger to obtain prior approval from the FTC. Both would serve to close a loophole in Section 7 of the Clayton Act by prohibiting acquisition of a competing company's assets when such acquisition results in a "lessening" of competition in the industry affected. At present the law bans only the acquisition of "stock or other share capital" of a competing industry.

Testifying before a Senate subcommittee, W. T. Kelley, general counsel for the Federal Trade Commission, declared that the closing of this loophole was essential to halt the spread of industrial mergers short of threatening the very existence of the American competitive system. The commission has been trying for a number of years to get this loophole closed, and it recommended such legislation during the hearings of the old Temporary National Economic Committee. Such legislation now is more necessary than ever before, said Mr. Kelley, because of the sharp upward sweep in the merger movement since the war.

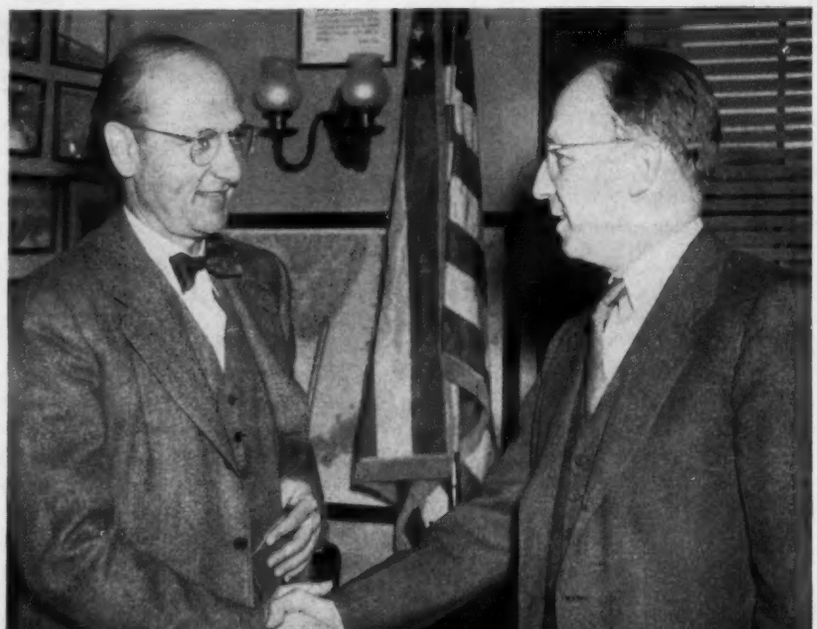
Among 18 corporations which have made the largest number of acquisitions in the current movement from 1940 through 1946, Mr. Kelley cited Continental Can Co., Food Machinery Corp., Dresser Industries Inc., United States Steel Corp., Bethlehem Steel Co., Jones & Laughlin Steel Corp., General American Transportation Co., Norma Electric Corp. and Barium Steel Corp. He summed up by saying that 37 metal-fabricating concerns were acquired by six of the above-named companies that are listed among the nation's 200 largest manufacturing corporations.

Mr. Kelley reported as peculiarly significant these acquisitions: General Electric Co.'s acquisition of Mahoning Valley Steel Co., Niles, O., Borg-Warner Corp.'s acquisition of assets of the Superior Sheet Steel Co., Canton, O.; and International Detrola Corp.'s acquisition of Andrews Steel Co., Newport, Ky.

"There are few materials which have been in greater demand since the war than steel sheets," said Mr. Kelley. "The purchase of sheet steel facilities by these large manufacturers has, of course, reduced the supply of this tight material which is available for smaller fabricators."

May Extend Export Controls

President Truman's request for an extension of the Export Control Act beyond June 30, 1947, has been taken up by the Senate Judiciary and House Armed Services committees. Chances are that the act will be extended by one year. Details, as to whether hearings will be held, and whether to extend the powers broadly or limit them by definition, remain to be determined.



LILIENTHAL APPROVED: Sen. Bourke B. Hickenlooper (Rep., Iowa) congratulates David E. Lilienthal, left, following confirmation for the latter's appointment as chairman of the Atomic Energy Commission. Hickenlooper is chairman of the Senate Atomic Energy Committee. NEA photo

Reorganization of Welsh Sheet And Tin Plate Industry Planned

Modernization to require more than four years for completion. Substantial savings, up to not less than 30 per cent, anticipated. British steel imports rise but exports decline in February compared with year ago

PLANS for reorganization of the Welsh sheet and tin plate industry, involving up to £50 million sterling, are under consideration by the Minister of Supply. A period of four and a half years is expected to elapse before anything like full production can be achieved, but eventually the project will have an important bearing not only on the industrial future of South Wales but upon that of Britain generally.

Conditions in the sheet and tin plate industry are exceptional and all current output is readily absorbed. But in pursuance of a long term policy the imperative need for plant modernization and for the provision of new equipment is recognized.

According to the Tin Producers' Association, substantial savings in costs will be effected. In terms of prime costs per ton the new mills are expected to yield working economies for the tin plate industry of not less than 30 per cent. Allowing for capital charges, economies will still be something like 16 per cent, and the net advantage has since increased with the rise in fuel and labor costs.

February Imports Rose

Import returns for February, 1947, show a steel and iron total of 47,012 tons brought into Britain compared with 44,690 tons in the like month of 1946. Pig iron imports were 1226 tons in 1947 compared with 4517 tons in 1946, steel ingots 10,723 against 9056, semifinished 23,046 against 25,582. The biggest drop was in wire rods of which only 80 tons were imported against 3135 in February, 1946.

Exports totalled 131,917 tons in February against 186,018 tons in the same month of 1946. This was expected owing to the fuel crisis and urgent needs of the domestic market. The fall was most marked in sheets, only 9392 tons being sent abroad as compared with 30,239 tons in 1946. There were also big reductions in exports of rods, bars, angles, joists and strip. On the other hand, there was an increase in galvanized sheets which in February, 1946, totalled only 750 tons whereas this year the figure was 2577 tons. Cast tubes also jumped up from 4534 tons to 7658.

Iron and steel producers are faced with tremendous difficulties in all parts of the country. Owing to congested order books many tonnages were cancelled automatically at the end of March, and producers are now making a fresh start with deliveries. Shortage of locomotives and railroad cars, however, prevents movement of material in and out of the works.

Supplies of raw materials are improving and there has been a steady rise in coal output recently which should make for better conditions. Coke is in short supply and this has resulted in reduced output at foundries, in some cases cutting it down by as much as two thirds. Light castings are urgently needed throughout Britain for housing work which is now under way again after weeks of enforced idleness due to severe weather conditions. The house building program also involves the supply of a considerable tonnage of sheets, nuts and bolts, etc.

On the northeast coast a shipbuilding boom calls for large tonnages of steel, with some firms booking as far ahead as 1950, but output will be limited for some time by amount of labor and materials available. Steelworks are overburdened with orders for material for electric generating stations, power plants, collieries, locomotives and cars, and the needs of the shipbuilders cannot be met as they would be under normal conditions.

Semifinished is very tight with many rerollers working on a hand-to-mouth basis.

Canadian Research Costs Top Prewar Expenditures

The Canadian government spent $34 million on research and other scientific work in 1946, while in 1938 the amount spent in this category was $6 million, according to a report prepared by the Canadian Economic Research Branch entitled "Research and Scientific Activity, Canadian Federal Expenditures, 1938-1946."

Italy To Supply Poland with Metal Products in Trade for Coal, Ore

ITALY and Poland have signed an agreement under which Poland will ship coal to Italy in payment for products of Italy's iron and steel industry and Italy will receive iron ore from Russia's resources in the Black Sea zone.

During 1947, Poland is scheduled to ship a million and a half tons of coal to Italy; in 1948, shipments are expected to be 3 million tons.

The Polish government also is negotiating with Italian shipbuilders for construction of three 19,000-ton liners. If talks are successful, Poland will supply iron ores to Italian iron and steelworks, or possibly the iron and steel itself.

Russia has approached Italian iron and steelworks with a proposal that the latter supply iron and steel items which Russia formerly obtained from Sweden but which are likely to be cut off by Swedish export restrictions. Russia is reported ready to supply the necessary iron ore and coal to the Italian steelworks.

The Italian government has worked out two programs for the reconstruction of the iron and steel industry to provide for the country's needs. These take into consideration the shortage of scrap, iron ore and coal. The first and immediate program provides for an output of one million tons of steel annually; the second and longer term plan provides for production of 2 million tons.

According to the first plan, 600,000 tons of steel would be produced in electric furnaces and 400,000 tons in open-hearth furnaces. Raw materials necessary to such output would include 930,000 tons of scrap, of which 480,000 tons would be obtained from national resources, 250,000 tons from salvage of war materials in Italy and 200,000 tons from imports; 175,000 tons of pig iron would be required and 460,000 tons of coal would have to be imported for the program.

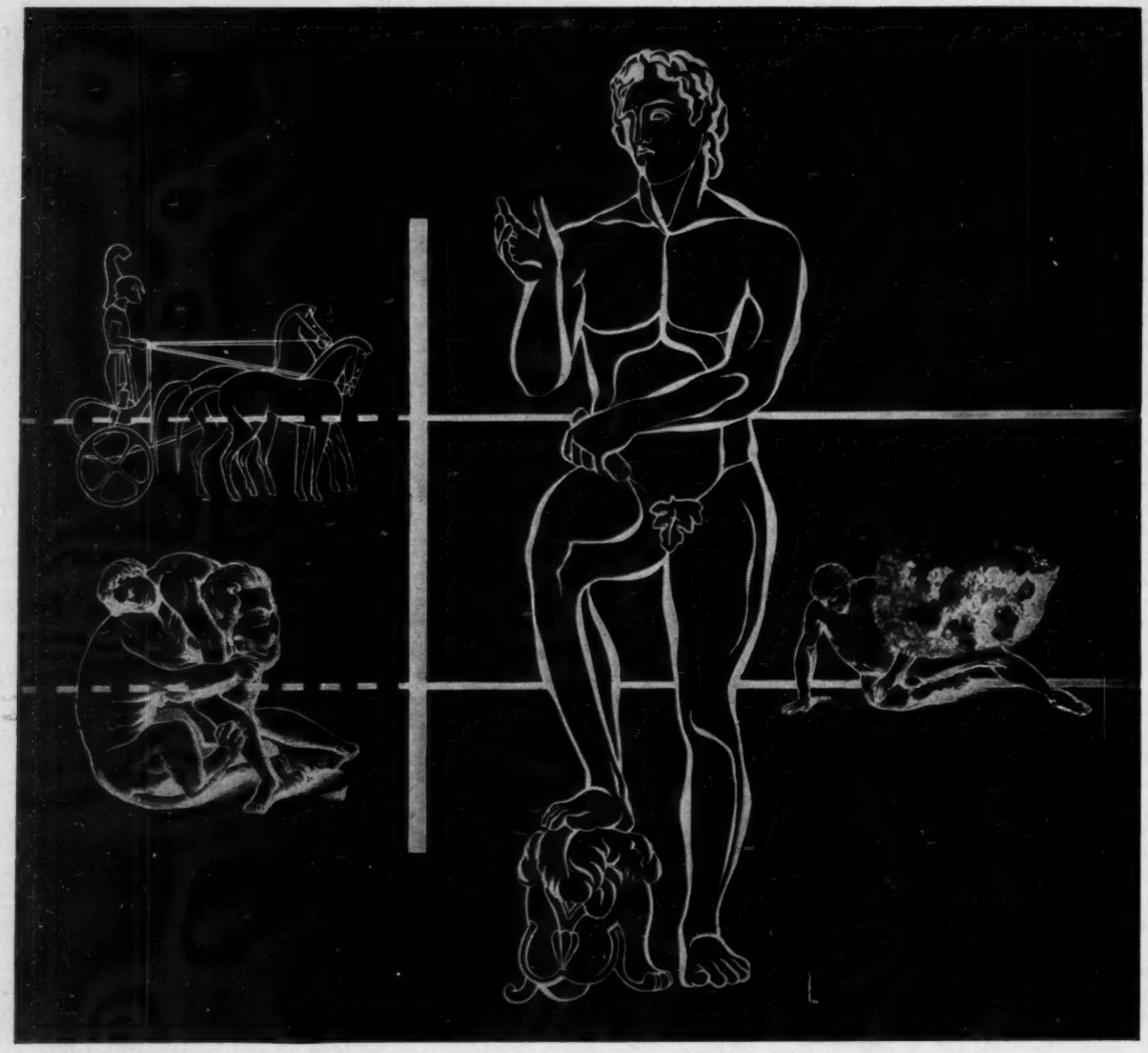
The longer term plan providing for 2 million tons would include 700,000 tons of electric steel and 1,300,000 tons of open hearth. This would require 1,560,000 tons of scrap, of which 600,000 tons would be obtained from the home market, perhaps 500,000 tons from war salvage, and the remainder from abroad. Program would require 655,000 tons of pig iron and 1,730,000 tons of imported coal and 1,600,000 tons of iron ore of which 400,000 tons would be imported.

Actually, Italy in 1946 exceeded the first program by producing 1,148,000 tons of steel and 200,000 tons of pig iron.

IT TAKES MORE THAN MUSCLE

According to legend, Polydamas, the Greek athlete, killed a lion with his bare hands, stopped a chariot in full flight, and lifted a raging bull off the ground with ease. His career, however, came to a spectacular end when he tried to catch a huge falling rock.

Today, sudden, heavy loads end the life of many steel parts. Low temperatures, for instance, can have a depressing effect on the impact strength of steels. Molybdenum steels, which combine deep hardening and freedom from temper brittleness, reduce this risk.



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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Agreement between General Motors and electrical workers, providing equivalent of 15-cent increase, may establish pattern for automotive wages, although UAW leaders insist they will maintain higher demands

DETROIT

CONCLUSION of an agreement between General Motors and the United Electrical, Radio and Machine Workers of America CIO, providing for the equivalent of a 15-cent hourly increase in wages, effective Apr. 14, provided at least one ray of hope that the generally deteriorating labor outlook throughout U. S. industry may recover without the paralyzing effects of strikes. Conversation naturally turned to the consideration of whether this increase might not eventually take the form of a national "pattern," in the same way that the 18½-cent increase of last year took hold.

The electrical workers' agreement covers 30,000 employees in four GM plants—Frigidaire and Delco Products at Dayton, O.; Packard Electric at Warren, O., and Delco Appliance at Rochester, N. Y. It provides that all wage rates and classifications of the hourly-rated employees represented by the UE-CIO will be increased by 11½ cents an hour (identical with the earlier rubber industry wage boost), and the balance of the 15 cents will apply to the cost of six paid holidays and other economic items. Holidays are New Year's, Memorial Day, Fourth of July, Labor Day, Thanksgiving and Christmas. The union's demand for a health, welfare and retirement allowance will continue as a subject for discussion and negotiation.

Agreement Is a Surprise

Announcement of the agreement, concluded after only a week's negotiations, came as a distinct surprise, particularly to the United Automobile Workers-CIO which only recently began negotiations with GM for a 23½-cent hourly wage increase covering its 220,000 members in GM plants. UAW leaders were considerably ruffled, but issued public statements that the 15-cent settlement with electrical workers would have no effect on their demands. Walter Reuther, UAW president, said the settlement was simply "public proof that the extremely favorable profit position of GM enables it to grant a still larger wage increase. . ."

What leads many to believe a pattern has been established is that last year a similar agreement was reached with electrical workers, later extended to automotive workers and then became a national trend. This spring, the automotive industry has been more or less marking time, waiting to see what action steel companies were going to take on wages; but the long delay in concluding these negotiations and finally their apparent breakdown probably convinced automobile companies they had better grab the ball and run with it themselves. Now it could well be that steel companies will be forced to follow the automotive pattern.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1947	1946
January	373,872	126,082
February	399,717	84,109
March	437,303*	140,738
April		248,108
May		247,620
June		216,637
July		331,000
August		359,111
September		342,969
October		410,510
November		380,664
December		380,908
12 mos.		3,268,456

* *Preliminary.*

Estimates for week ended:		
Mar. 29	100,355	43,070
April 5	97,385	47,735
April 12	97,988	50,425
April 19	100,000	58,565

Specifically, the wage agreement with electrical workers was stated to have been "arrived at through direct collective bargaining by the parties involved, and recognizes increased living costs and the necessity for maintaining continued, maximum and uninterrupted production. . . Both parties recognized the unsettled economic status of the country and the need for industry and labor to settle their mutual economic problems." The contract covers a year's period and may not be reopened or terminated before April 28, 1948.

Two days before the wage settlement with electrical workers was announced, GM had offered a 10-cent hourly wage increase to all CIO unions holding representation in its plants. This offer was made in recognition of the increased cost of living, particularly food costs. Provision was made that the issue could be reopened in August of this year, since unsettled economic conditions made it difficult to freeze any settlement for a year. At the time this offer was made it was announced that all hourly-rated employees not represented by unions were being given an immediate 10-cent increase, and salaried workers likewise were being accorded upward adjustments in proportion. The offer was turned down by the CIO unions involved, their leaders dismissing it as just a "feeler."

The crucial factor involved in the whole deal is whether a 15-cent increase, which amounts to over 10 per cent of the present average hourly rate, can be absorbed without any further price increases all along the line. At this stage it seems certain industry is going to make every effort to do so, and if production can be sustained, both in terms of quantity and quality, the try should be successful. Strikes on the part of the unions could upset the entire picture. Obviously a second round of both wage and price increases adds up to just that much more inflation. A moderate wage increase accompanied by intensified productive effort and no work stoppages, plus steady or lowered prices, will moderate the economic crack-up now being talked for midyear.

Chrysler's wage negotiations at this writing have not settled on any figure. Rumor had it the UAW eased off on its 23½-cent demand to 17½ cents, which conceivably could be further modified to the GM 15-cent pattern. However, the Chrysler local has announced filing of a strike notice, as a "precautionary" measure.

Ford Ends Pact with FAA

An unsettling note was the termination of the agreement between Ford Motor Co. and the Foremen's Association of America as of May 9, the company having issued such termination notice on April 8. When the present agreement was entered in May, 1944, the company's position was that whether or not it believed foremen's unions were sound, still it was willing to undertake a practical test. Three years' experience has convinced the company the experiment brought results just the opposite of those hoped for, largely because the

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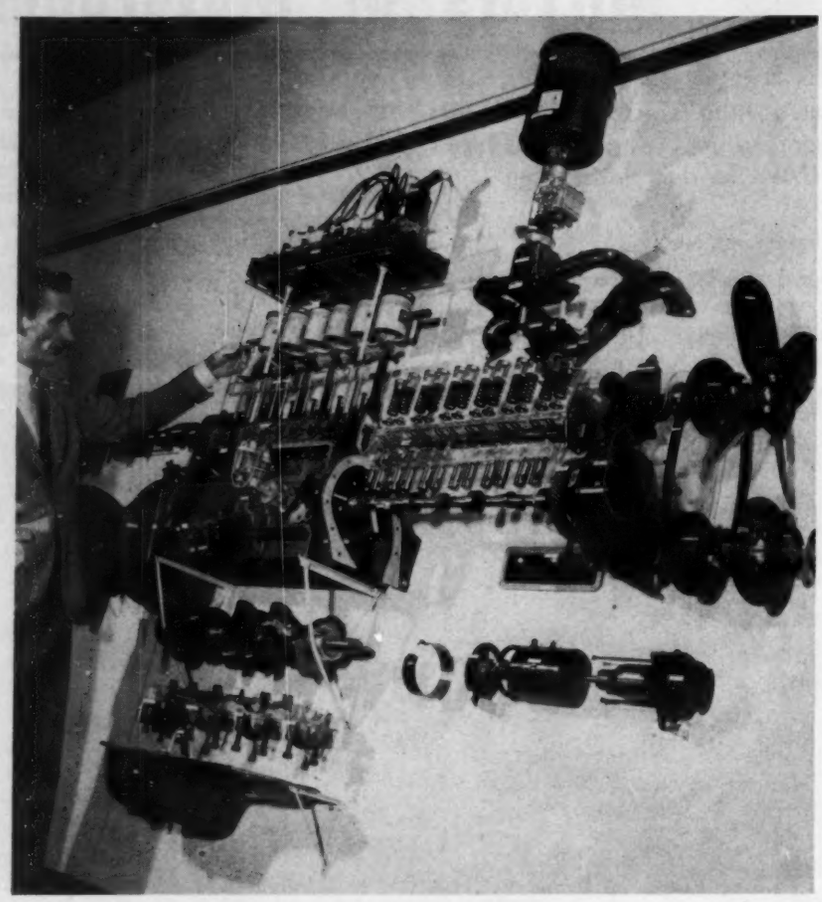


"EXPLODED" ENGINE: All parts of the drive units of an automobile chassis have been laid out and mounted in correct relative positions on a 224 sq ft board at Studebaker Corp. to show how an auto works and how its components go together. Display is used to train plant and field parts staff. Photo above shows a section of the engine explosion, in which parts have been drawn in three directions from the block and mounted in transparent plastic brackets

FAA, instead of exerting influence to draw foremen into closer relationship with the rest of management, worked in the reverse direction.

As recently as April 5, for example, 33 foremen, all except three from the rolling mill, walked off their jobs without permission and contrary to specific instructions to remain. They stayed off the job for several hours attending a meeting of the association. While no damage resulted, such absence certainly involved risks to employees and property in the rolling mill.

Further, the association recently instructed its members not to comply with company requirements that they check employees under their supervision at various locations away from the job where they were felt to be loitering. Spokesmen for the association refused to agree with the company as to the proper technique for handling an admittedly bad situation which is clearly the responsibility of the company and not an outside union.

Several months ago the company proposed a number of constructive amendments designed to improve relationships with foremen, to define more clearly the respective areas of responsibility and to close the gulf between foremen and other members of management. After months of negotiations, the foremen's association has not agreed to a single major proposal, and has failed to produce any counter-proposal which would lead to these goals. In the face of these practical difficulties, the company had no other course but to terminate the agreement. The action immediately resulted in a strike notice being authorized by the executive board of the FAA. A walkout of Ford foremen would quickly tie up the entire River Rouge plant.

Prices High, Quality Poor

High price and poor quality of new passenger cars and trucks continue to be twin topics of conversation in automotive circles. Top management recognizes both shortcomings and is making strenuous efforts to correct the latter as quickly as possible and the former probably in the next series of models. Defective workmanship and materials go all the way back to sources of raw materials and the only way auto plants can correct them is by means of intensive inspection. Even with the most careful checking it is not possible to detect and adjust all flaws for the reason assembly lines become so congested with cars needing light repairs production is held back.

On the score of price, engineers and designers are making strenuous efforts to work out manufacturing techniques and material utilization which will reduce the number of man-hours of direct labor required to build cars. Elimination of composite built-up assemblies in favor of integrally produced parts is one method being given special emphasis. This may require complicated and special tooling and the best brains of the tool and die industry are wrestling with the problems now.

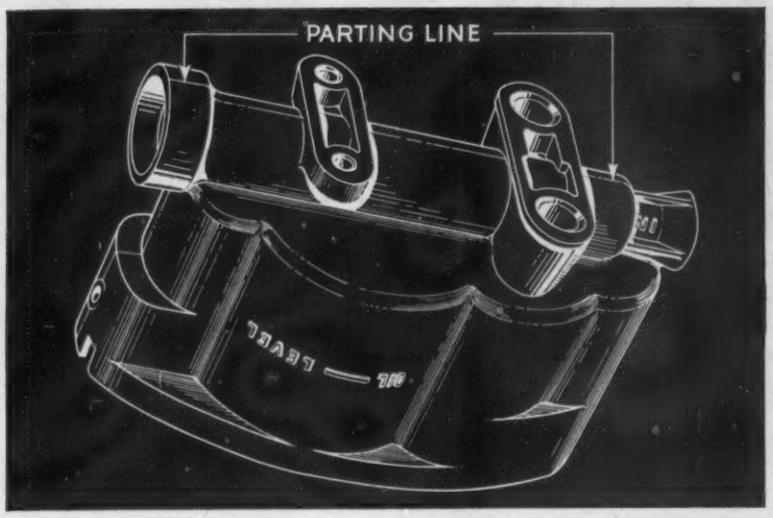
Ask Employees' Suggestions

Meanwhile employees are being urged to contribute suggestions for improving the product or simplifying manufacturing operations. Lincoln Division of Ford late this month is inaugurating a new suggestion system which will pay off in cash awards for acceptable ideas leading to betterment of the product, advancement of operations, improvement of working conditions or the perfection of safety devices. Employees submitting worthwhile suggestions will be awarded 100 per cent of the first two months' gross savings to the company, with no limit to the maximum award.

Booklets describing the plan have been mailed to all employees; suggestion blanks and boxes to receive them have been stationed about the plant. An evaluating committee has been established to study all suggestions and to approve, disapprove, modify, refer or hold the submitted idea for further consideration. Should a suggestion be turned down, the supervisor of the employee suggestion unit contacts the employee and explains the reasons in detail.

Kaiser-Frazer Sees Black Ink

Kaiser-Frazer expects to go into black ink this month as a result of breaking its bottleneck on motors through the recent deal with Continental Motors. Production this month is expected to hit 8000 units and may reach 11,000 in May. Contrary to published reports, Kaiser-Frazer's order backlog has not been reduced, according to a company executive.

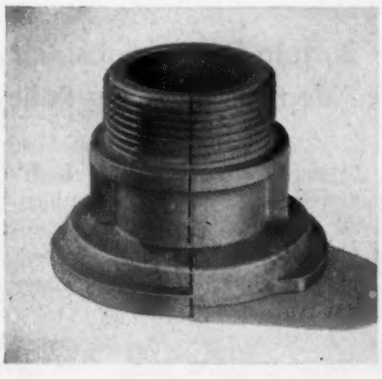


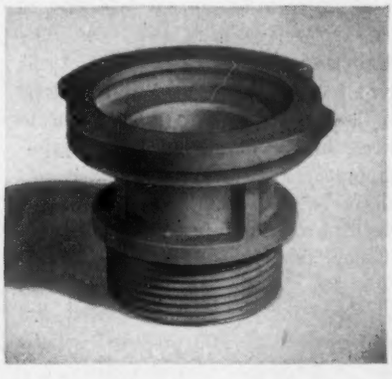
UNDERCUTS—WHEN TO USE AND WHEN TO AVOID THEM

In designing die castings, undercuts (recesses in casting walls which interfere with ejection from the die) should be avoided, if possible, since they entail the added cost of movable die cores. Where undercuts cannot be avoided, however, the designer will profit from early consultation with the die caster to arrive at the most economical means of production.

The above zinc alloy die cast oil reservoir is a good case in point. By casting this piece with the parting line through the axis of the tube at the bottom, the recesses next to the tube are formed by fixed portions of the die. Although movable cores are still required (to form the interior of the casting, the tube openings and the holes and recesses in the base flanges) there are such compensating advantages as uniformly thin wall sections and overall weight reduction. Furthermore, this method of production permits engraved lettering on the side walls of the casting.

Shown below is a zinc alloy die cast fitting in which one undercut was eliminated through die design and another was obtained with economy by subsequent machining. Ordinarily the recess between the two longitudinal ribs (see photograph at the left) would be regarded as an undercut. By parting the casting in the plane of its axis, however, this recess (and another on the reverse side of the casting) is formed by fixed projections in each half of the die. This method of parting also makes it possible to cast the external thread which is later chased. There is, however, an annular groove inside the flange on this casting (see photograph at the right) which does constitute an undercut. It would be possible to form this groove with "knockout" cores in the die but, since this would greatly retard casting speed and probably necessitate some machining, the piece is chucked and the entire groove is machined from the solid.





ALLOY SELECTION

Equally important to the design of a die casting is the selection of the proper alloy for its production. The zinc alloys used in the die casting industry conform to specifications of the American Society For Testing Materials and the Society of Automotive Engineers (see table below). When a casting is properly designed and the alloy composition is carefully controlled with respect to every element involved, outstanding mechanical properties and dimensional stability will be assured in zinc alloy die castings.

Zamak* and Corresponding A.S.T.M. and S.A.E. Alloys

	A.S.T.M.	S.A.E.
Zamak-3	XXIII	903
Zamak-5	XXV	925

*A trade mark (registered in the U. S. Patent Office) identifying the zinc alloys developed by The New Jersey Zinc Company and used in the die casting industry.

For additional data on die casting design ask us—or your die casting source—for a copy of the booklet "Designing For Die Casting".

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Heavy Demand Continues for Office Equipment

Addressograph - Multigraph and Remington Rand experience record years with prospects bright for next 12 months

SUSTAINED heavy demand for office equipment has kept the order backlog at a high level for more than a year with Addressograph-Multigraph Corp., Cleveland, and Remington Rand Inc., Buffalo, experiencing a substantial increase in production and shipments of their office equipment for the first three months of this year.

This was disclosed in the respective companies' annual reports for last year. George C. Brainard, Addressograph president, announced a new accounting machine which automatically totals payrolls or dividend payments while simultaneously turning out checks for employees or stockholders. New orders for all Addressograph equipment, the report stated, were on a par with current shipments.

Remington Rand plans further expansion this year and is now seeking to acquire assets of General Aniline & Film Corp., New York, in a project to increase its production of equipment and supplies for photographing business records.

With shipments of Addressograph-Multigraph machines now at a rate of about $3.5 million a month, sales for the current fiscal year ending July 1 may total $36 million as compared with $25.6 million for the previous 12 months. For the nine months ended Dec. 31, 1946, Remington Rand had sales of $101 million with perhaps an additional 40 per cent added to this for the last quarter ending March 31, 1947. Sales for the previous fiscal year amounted to almost $108 million.

It is estimated that the general office equipment industry experienced a sales increase of 32.9 per cent in 1946 over 1945.

RECEIVES AWARD: Frederick C. Crawford, left, president, Thompson Products Inc., Cleveland, received the first Distinguished Service Award presented by the Cleveland Technical Societies. Presentation was made by Prof. G. Brooks Earnest, right, Case Institute of Technology and council president, and Clarence L. Collens, center, chairman of Reliance Electric & Engineering Co. Award is for contributions to the "advancement and welfare of engineering and technical professions" and will be made annually

Goodyear Building Huge Conveyor Belt for Coal

Goodyear Tire & Rubber Co., Akron, is constructing a rubber conveyor belt designed to raise 600 tons of coal an hour to a height of 715 feet. According to Goodyear, this lift is the largest yet attempted in conveyor belt operation.

The belt, which will be a half mile long and 42 inches wide, will be used by Tennessee Coal, Iron & Railroad Co. in its new Concord mine near Birmingham. When in operation late this year, the belt will move coal from the bottom of the slope to a tipple at the mouth of the mine.

Lincoln Electric Plans New 50-Acre Plant in Cleveland

Lincoln Electric Co., Cleveland, plans to build a plant with 2 million sq ft of floor space covering 50 acres of ground at E. 179th St. and St. Clair Ave.

More than four times the size of the present factory, the new facility will be built "just as soon as builders want to build again," as James F. Lincoln, president, put it. It was intimated that this wouldn't be until next year. The building will have one story and will eventually completely replace the present plant at Coit Rd., which will be abandoned.

When the new plant is completed, the present payroll of 1000 probably will be trebled, according to company officials.

McConway & Torley Buys Castings Plant from WAA

The government-owned steel castings facility adjoining the plant of McConway & Torley Corp. in Pittsburgh has been sold by War Assets Administration to the McConway company for $337,500.

The facility was built at a cost of $1,247,933 to expand McConway's war output of heavy steel tank armor from 2500 to 5000 tons per month. The property consists of a main foundry building with a high bay and lean-to having an area of 40,000 sq ft that serves as a connecting link to the corporation's main foundry. As constructed, the plant could not be operated independently.

Buffalo Forge, Subsidiary Adopt Firm Pricing Policy

In an attempt to prevent further inflation, Buffalo Forge Co., Buffalo, and its subsidiary, Buffalo Pumps Inc., adopted a firm pricing policy, effective Apr. 11, on all lines of fans, blowers, power plant equipment, air conditioning equipment, unit heaters and pumps.

In making the announcement, E. F. Wendt, president, said: "We have decided that the best interests of the country will be served by a return to normal pricing procedure. While we have no similar assurance that our costs of labor and purchased materials may not be subject to increase, it is our hope that spiraling prices will not continue."

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

General Electric Co., Schenectady, N. Y., will spend $1 million during 1947 for employee education. More than 12,000 employees and 500 instructors participate in courses ranging from apprentice training to scientific subjects.

—o—

Eastern Industries Inc., New Haven, Conn., manufacturer of pumps, laboratory equipment and electric signal devices, has purchased McIntyre Co., Newton, Mass., maker of pumps and fluid motors. As McIntyre Division the facility will continue to manufacture its products, and key personnel will remain with the new division.

—o—

N. Ransohoff Inc., Cincinnati, manufacturer of washing machines, equipment for the surface treatment of metals and foundry cleaning mills, has purchased a plant located at 16 E. 72nd St., Cincinnati.

—o—

Taylor-Hall Welding Corp., Warren, O., subsidiary of Federal Machine & Welder Co., has entered into an agreement with Do-All Co., Des Plaines, Ill., which gives Do-All the exclusive right to sell Taylor-Hall welding equipment in the export market.

—o—

Carnegie-Illinois Steel Corp., Pittsburgh, subsidiary of United States Steel Corp., has produced a sound slide film, "Highballing," to show how the industrial shipper can co-operate in combatting the nation's freight car shortage.

—o—

Stinson Division, Wayne, Mich., Consolidated Vultee Aircraft Corp., has developed a line of accessories and optional equipment for its flying station wagon and 4-place voyager.

—o—

Ellinwood Industries, Los Angeles, and its licensee, Ellinwood Industries Inc., Huntington, W. Va., produced and sold $500,000 worth of farm equipment in March, a new record.

—o—

Andover Kent Aviation Corp., New Brunswick, N. J., manufacturer of aviation parts, has merged its Plastics Division with Rodic Rubber Corp., New Brunswick, a subsidiary.

—o—

Case School of Applied Science, Cleveland, has changed its name to Case Institute of Technology.

—o—

Standard Transformer Co., Warren, O., has appointed R. Thorp & Associates, Kansas City, Mo., as sales representative in Kansas and western Missouri for Standard's line of transformers.

—o—

Al-Fin Corp., subsidiary of Fairchild Engine & Airplane Corp., has moved from Hollis, N. Y., to Farmingdale, N. Y., where its offices and foundry are located in the plant of the Ranger Aircraft Engines Division of Fairchild. The corporation is developing several types of gears, bearings, finned assemblies and heat exchangers.

—o—

Monsanto Chemical Co., St. Louis, has opened a sales and export office in Boston, with Thornton Jesdale in charge.

—o—

Bryant Heater Co., Cleveland, has named Dudley & Garland, Boston, as sales representative in New England for Bryant industrial gas combustion equipment.

—o—

Markel Electric Products Inc., Buffalo, manufacturer of lighting and other electrical equipment, has launched a $100,000 expansion program including purchase of an additional building with 40,000 sq ft of manufacturing space.

—o—

Independent Pneumatic Tool Co., Chicago, manufacturer of portable pneumatic and electric tools, has opened a technical office at Sao Paulo, Brazil, with Reuben P. Rudy as manager.

—o—

Bendix Home Appliances Inc., South Bend, Ind., announces first quarter sales totalled $17,269,393, a 190 per cent increase over the $5,938,680 total at the same time a year ago.

—o—

Parker Rust Proof of Cleveland is moving into its new plant at 3605 Perkins Ave. which it purchased for $80,000. New facilities will enable the firm to treat 60,000 pounds of metal a day.

—o—

Dayton Acme Co., Cincinnati, manufacturer of food processing machinery, has taken over the production and distribution of a portable, electric signal flare formerly produced by Safety Signals Inc., Canton, O. Dayton Acme expects to be in production by July 1.

—o—

Electrochemical Society Inc., New York, had 2233 members as of Jan. 1, 1947, which represents an increase of 320 since the same time last year.

—o—

Monroe Auto Equipment Co., Monroe, Mich., has completed its $3,500,000 expansion program and plans to concentrate a large part of its enlarged engineering and factory facilites on the manufacture of equipment for railroad passenger and freight cars, particularly hydraulic shock absorbers.

—o—

Syracuse University, Syracuse, N. Y., has purchased a government war surplus plant there for $214,500. Operated during the war by Lipe Rollway Corp., the facility will now be used for vocatonal training in connection with the university's engineering course.

—o—

Bailey Meter Co., Cleveland, manufacturer of power plant and industrial process control equipment, has appointed Portilla Corp. as its agent in Puerto Rico.

—o—

Vernon H. Craggs Inc., Baltimore, has been appointed agent in the western hemisphere, except Brazil, by A. R. Heathcote Co. Ltd., Sheffield, England, for the firm's line of knives.

—o—

American Magnesium Co., Buffalo, is expanding production of lightweight castings made from magnesium for saddles, crankshafts, pneumatic tools and housings for power saws.

—o—

Beloit Iron Works, Beloit, Wis., manufacturer of paper mill machinery, has purchased the land and buildings of R. J. Dowd Knife Works Division of Simonds Worden White Co., Dayton, O. Dowd's manufacturing operations will be carried on at the parent company's Cleveland and Dayton plants. Beloit's action is part of the firm's expansion program.

—o—

American Ironing Machine Co., Algonquin, Ill., has merged with Barlow & Seelig Mfg. Co., Ripon, Wis., maker of clothes washing equipment. The former firm will be called Iron Division of Barlow & Seelig.

—o—

Reading Chain & Block Corp., Reading, Pa., manufacturer of materials handling equipment, has appointed Yarrington & Johns Inc., Baltimore, as representative for Delaware and Maryland and the cities of York and Lancaster, Pa.

—o—

National Malleable & Steel Castings Co., Cleveland, has announced that it is commencing work on a steel wheel for Fruehauf Trailer Co., Detroit.

—o—

Lawrence Warehouse Co., San Francisco, has published a booklet describing its plan for field warehousing which is a means of controlling inventory on a borrower's own premises to make it available as collateral for a secured line of credit from a bank or other lending agency.

The Business Trend

Production Levels Off After Moderate Decline

RETURN of virtually all of the nation's coal miners to work has halted the downtrend in industrial activity but lack of progress in labor negotiations in other industries, particularly the basic steel industry, was the source of considerable uneasiness last week.

After declining for two weeks, STEEL's industrial production index leveled off in the week ended Apr. 12 and registered 156 per cent of the 1936-1939 average. The previous week's level also had been 156 per cent.

COAL—Only 3,800,000 net tons of bituminous coal were estimated to have been mined during the week ended Apr. 5, the week the miners observed as a "mourning period." Output had been running above 12 million tons weekly.

STEEL—Notwithstanding the coal miners' work stoppage which pinched down fuel supplies, the steel industry has been able to maintain a high rate of ingot production, the output easing off only fractionally from the postwar high level attained late in March and early in April.

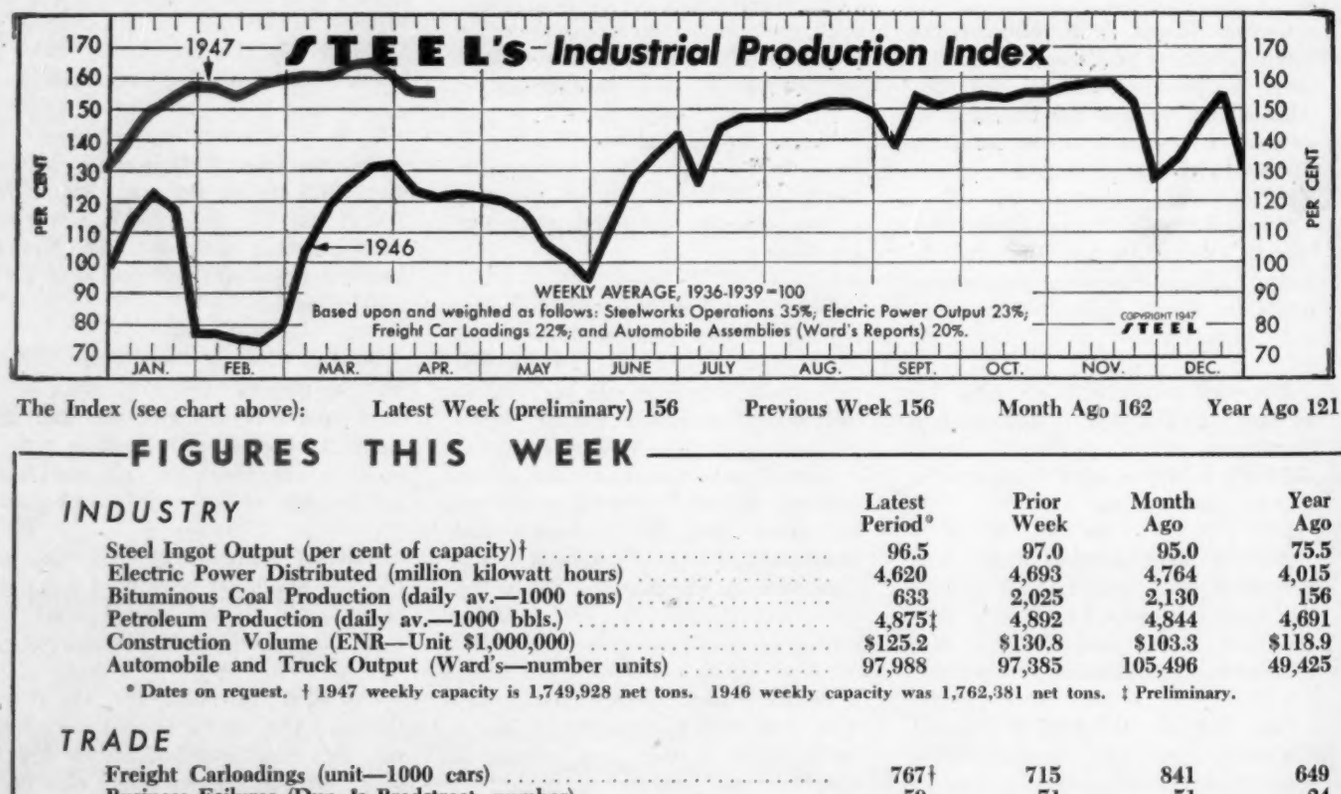
AUTOS—Meanwhile, the automobile industry was reflecting effects of floods in Michigan and a brief shutdown of the Ford Motor Co. in respect to the late Henry Ford. Consequently, the industry's output in the week ended Apr. 12 was only an estimated 97,988 passenger cars, trucks and busses, compared with the postwar high level of 108,472 units during the week ended Mar. 22.

PRICES—For the first time in a month a decline was registered in the U. S. Bureau of Labor Statistics wholesale price average in the week ended Apr. 5. Although it was not great the decline lowered the index to 148.8 per cent of the 1926 average. In the preceding week it had been 149.4. The decline was attributed to lower prices for agricultural commodities. Meanwhile, nonagricultural commodities continued to advance.

TRUCK LOADINGS—Volume of freight hauled by motor carriers in February decreased 5.9 per cent below January but rose 22.9 per cent over February, 1946, the American Trucking Associations Inc. reports. For February the associations' index was 200 per cent of the average monthly tonnage of the reporting carriers for 1938-1940, inclusive.

EMPLOYMENT—The high level of industrial production during March was accompanied by a rise in the civilian labor force, the Bureau of the Census reporting the civilian labor force that month consisted of 58,390,000 workers, compared with 58,010,000 in February and 55,160,000 in January. Unemployment in March was placed at 2,330,000, down from the 2,490,000 in February and the 2,400,000 in January.

BUYING POLICY—Short-term commitments are the order of the day among purchasing agents, the National Association of Purchasing Agents reports. Many purchasers are on a "hand-to-mouth" basis in buying readily available materials. The predominant purchasing policy currently is one to three months.



The Index (see chart above): Latest Week (preliminary) 156 Previous Week 156 Month Ago 162 Year Ago 121

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	96.5	97.0	95.0	75.5
Electric Power Distributed (million kilowatt hours)	4,620	4,693	4,764	4,015
Bituminous Coal Production (daily av.—1000 tons)	633	2,025	2,130	156
Petroleum Production (daily av.—1000 bbls.)	4,875‡	4,892	4,844	4,691
Construction Volume (ENR—Unit $1,000,000)	$125.2	$130.8	$103.3	$118.9
Automobile and Truck Output (Ward's—number units)	97,988	97,385	105,496	49,425

* Dates on request. † 1947 weekly capacity is 1,749,928 net tons. 1946 weekly capacity was 1,762,381 net tons. ‡ Preliminary.

TRADE				
Freight Carloadings (unit—1000 cars)	767†	715	841	649
Business Failures (Dun & Bradstreet, number)	59	71	51	24
Money in Circulation (in millions of dollars)‡	$28,250	$28,247	$28,330	$27,955
Department Store Sales (change from like wk. a yr. ago)‡	+17%	+10%	+9%	+50%

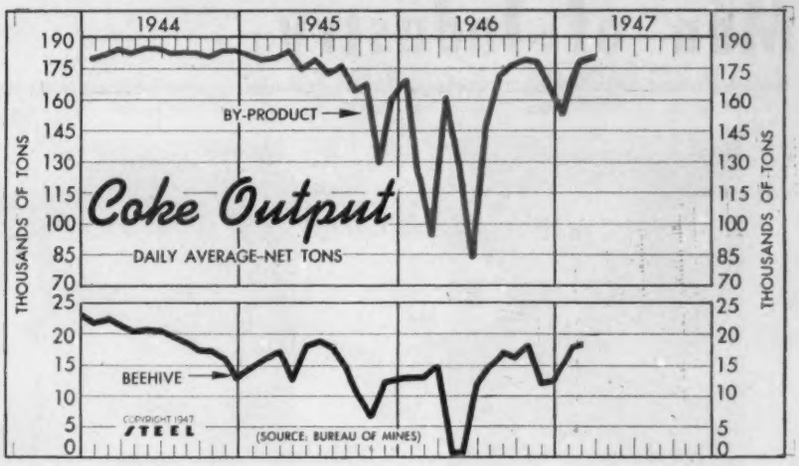
† Preliminary. ‡ Federal Reserve Board.

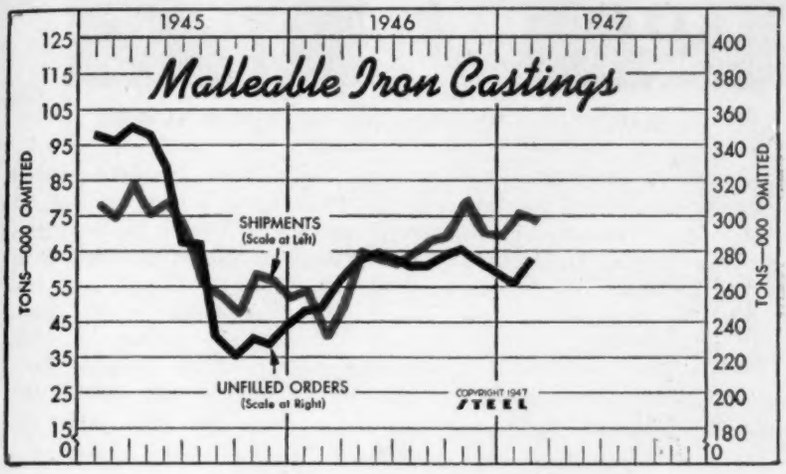
Coke Output

Bureau of Mines

(Daily Average—Net Tons)

	By-Product		Beehive	
	1947	1946	1947	1946
Jan.	181,245	122,570	18,124	13,093
Feb.	183,189	93,985	18,265	13,140
Mar.	.....	161,290	.....	14,962
Apr.	.....	128,394	.....	713
May	.....	83,019	.....	869
June	.....	147,272	.....	12,218
July	.....	171,703	.....	15,105
Aug.	.....	176,195	.....	16,892
Sept.	.....	178,156	.....	16,167
Oct.	.....	177,817	.....	17,954
Nov.	.....	164,165	.....	12,028
Dec.	.....	153,826	.....	12,302
Ave.	.....	146,877	.....	11,991





Malleable Iron Castings

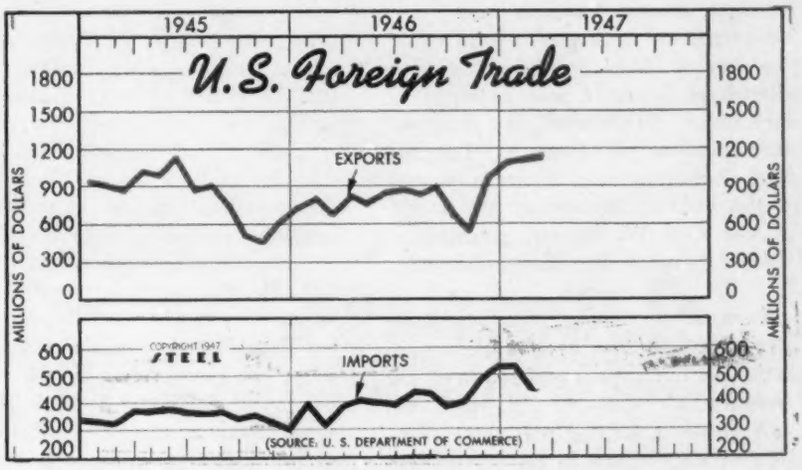
	Shipments (000 omitted)		Unfilled orders for castings for sale (000 omitted)	
	1947	1946	1947	1946
Jan.	75.9	54.0	260	246
Feb.	74.7	40.2	274	249
Mar.	...	50.2	...	263
Apr.	...	65.0	...	268
May	...	62.6	...	272
June	...	61.6	...	276
July	...	64.4	...	272
Aug.	...	67.9	...	273
Sept.	...	69.5	...	277
Oct.	...	79.2	...	281
Nov.	...	69.0	...	278
Dec.	...	68.3	...	268

Foreign Trade

Bureau of Foreign and Domestic Commerce

(Unit Value—$1,000,000)

	Exports			Imports		
	1947	1946	1945	1947	1946	1945
Jan.	1,116	799	903	533	394	334
Feb.	1,153	670	887	435	318	325
Mar.	....	815	1,030	...	384	365
Apr.	....	757	1,005	...	407	366
May	....	851	1,135	...	397	372
June	....	878	870	...	386	360
July	....	826	893	...	434	356
Aug.	....	883	737	...	426	360
Sept.	....	643	514	...	378	335
Oct.	....	537	455	...	394	344
Nov.	....	987	639	...	481	322
Dec.	....	1,097	736	...	536	297
Total	....	9,743	9,804	...	4,935	4,136



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,781	$14,254	$11,984	$11,828
Federal Gross Debt (billions)	$258.0	$257.9	$260.8	$273.8
Bond Volume, NYSE (millions)	$18.9	$13.0	$17.3	$30.9
Stocks Sales, NYSE (thousands)	4,664	3,120	4,808	7,591
Loans and Investments (billions)†	$54.8	$55.2	$55.4	$65.2
United States Gov't. Obligations Held (millions)†	$34,151	$34,695	$35,301	$46,538

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$69.82	$69.82	$69.82	$63.54
All Commodities†	148.8	149.4	148.7	109.1
Industrial Raw Materials†	164.0	165.5	162.5	122.2
Manufactured Products†	142.8	143.3	143.7	104.6

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

ROSS L. LEFFLER

JOHN S. CSAKLOS

ALEXANDER W. LANSBERG

Ross L. Leffler has been appointed assistant to the president, Carnegie-Illinois Steel Corp., Pittsburgh, subsidiary of U. S. Steel Corp. He became associated with U. S. Steel in 1910, and came to Carnegie-Illinois in 1935 as director of industrial relations, Pittsburgh office. He has recently been assistant to the manager of operations, Pittsburgh district.

—o—

H. E. Lewis, former chairman and president, Jones & Laughlin Steel Corp., Pittsburgh, and a director of the American Iron & Steel Institute, has been elected an honorary vice president of the institute. **Ben Moreell,** new chairman and president of Jones & Laughlin Steel Corp., has been elected a director of the institute succeeding Mr. Lewis, as was **Carl W. Meyers,** president of Colorado Fuel & Iron Corp., Denver.

—o—

Kenneth W. Stooky, Gas Machinery Co., Cleveland, has been elected president. He has been associated with the company for the past 18 years and vice president for the past three years. He succeeds **William E. Steinwedell,** one of the founders of the company, who has been elected chairman of the board. **Joseph C. Calhoun Jr.,** vice president, retains that office, and has been elected secretary. **Theodore Schroeder** continues as treasurer of the company.

—o—

William H. Milton Jr. and **Ray W. Turnbull** have been elected commercial vice presidents of General Electric Co., Schenectady, N. Y. Mr. Milton, formerly assistant general manager of the Chemical Department, will be in charge of customer relations in the District of Columbia. Mr. Turnbull, resigned as president of Hotpoint Inc., a General Electric manufacturing affiliate, will be in charge of customer relations in the Far West. **Raymond M. Alvord,** commercial manager in San Francisco, will relinquish his post to Mr. Turnbull on Sept. 1, and at the end of that month, will retire after 43 years' service with the company.

—o—

John S. Csaklos and **Alexander W. Lansberg** have been elected vice presidents of the Hartford Electric Steel Corp., Hartford, Conn. **Thomas M. Ecker** has been appointed assistant to the president, and **Robert T. Clarke,** assistant secretary-treasurer. Mr. Csaklos will retain the position of works manager which he has held since joining the company in 1946. He had formerly been foundry superintendent of Reading Steel Casting Co., Reading, Pa. Mr. Lansberg will retain the position of secretary-treasurer.

—o—

J. H. Hillman Jr., president, Pittsburgh Coke & Chemical Co., Pittsburgh, has been elected chairman of the board, filling the vacancy left by the death of **George S. Davison. Richard M. Marshall,** executive vice president, has been named president to succeed Mr. Hillman. Mr. Marshall became associated with the company in 1941, and had formerly been vice president and general manager of Woodward Iron Co., Birmingham, and vice president of Sloss-Sheffield Steel & Iron Co., Birmingham. **C. E. Dignan,** formerly works manager at the Neville Island plant, has been elected vice president of operations, and **W. S. Scott,** formerly general manager of sales, has been elected vice president of sales.

—o—

R. H. Daisley has been elected vice president and director of manufacturing, Eaton Mfg. Co., Cleveland, and **H. J. McGinn,** vice president and director of sales. **Richard Inglis** has been elected vice president and general counsel for the company. Mr. Daisley has been general manager of the Wilcox-Rich Division, with offices in Detroit, and had been elected a director of the company in 1941. Mr. McGinn has been general manager of the Reliance Division, and a director since 1932. Mr. Inglis has been associated with the company since 1922 when he became a director of the Torbensen Axle Co., a predecessor of the present corporation.

—o—

J. J. Hessler, American Bridge Co., subsidiary of U. S. Steel Corp., has been appointed contracting manager in charge of the company's Pittsburgh office. He succeeds **George E. Poucher,** retired after 45 years' service. **James A. Richards** has been appointed assistant to Mr. Hessler.

—o—

Harry Toulmin Jr. has been elected chairman of the board of Tucker Corp., New York. He is president and board chairman of Hydraulic Press Mfg. Co., Mt. Gilead, O.

—o—

William S. Lyhne and **E. A. Ruggles,** division heads of F. L. Jacobs Co., Detroit, have been elected vice presidents of the company. Mr. Lyhne has been general manager of the Indianapolis Division and Mr. Ruggles, general manager of the company's Spring Division, Danville, Ill.

—o—

William G. Mather has resigned as chairman and member of the boards of directors of the Cleveland Cliffs Iron Co., and the Cliffs Corp., Cleveland.

—o—

R. C. Cosgrove, general manager, Crosley Division, and vice president in charge of sales, Avco Mfg. Corp., Cincinnati, has been elected to the board of

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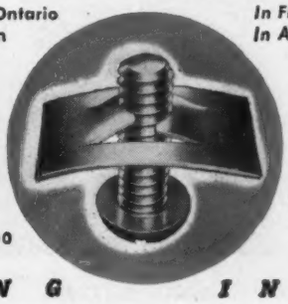

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FASTEST THING IN FASTENINGS

directors of the corporation. He had been vice president and general manager of the Crosley Corp. before acquisition by Avco. **James D. Shouse,** formerly a vice president of the Crosley Corp., now president and a director of the corporation's wholly-owned subsidiary, Crosley Broadcasting Corp., has also been elected to the board. Other new directors are **Carl H. Kindl, J. H. Oppenheim,** and **Harry Woodhead.**

—o—

William A. Wood, formerly secretary, Aetna Ball & Roller Bearing Co., Chicago, has been elected vice president of the company. **E. E. Johnson,** comptroller, has been named to succeed Mr. Wood.

—o—

Earle E. Ellwood has been appointed district sales manager, St. Louis district, for the Youngstown Sheet & Tube Co., Youngstown. He succeeds **H. H. Richardson,** retired.

—o—

William P. Webster has been elected to the board of directors, Clark Mfg. Co., Cleveland. He became associated with the company in 1944 as office manager, later becoming purchasing agent, then assistant to the secretary.

—o—

Dr. Willis R. Whitney and **Dr. Frank N. Speller** have been named first recipients of the newly established awards of the National Association of Corrosion Engineers, Houston, Tex., in acknowledgement of outstanding contributions to the science of corrosion and corrosion engineering. The awards are known as the Willis Rodney Whitney Award in the Science of Corrosion, and the Frank Newman Speller Award in Corrosion Engineering, named in honor of their first recipients.

—o—

R. A. Rowlands, Electronics & Merchandising Divisions, International General Electric Co., Schenectady, N. Y., has been appointed assistant to **C. G. Roberts,** manager of the divisions. Mr. Rowlands will be responsible for relations with General Electric Co., its affiliates and outside suppliers. Karl Philippi has been named sales manager of the divisions.

—o—

E. M. Flannery, vice president, Bush Mfg. Co., Hartford, Conn., has been elected president of the Refrigeration Equipment Manufacturers' Association. He succeeds **H. F. Spoehrer,** vice president of Sporlan Valve Co., St. Louis.

—o—

Joseph F. Hart has been appointed manager of the new department of sales engineering, organized by Cee-Bee Chemical Co. Inc., Los Angeles. He is succeeded as technical director of the company by **Keith Whitcomb,** formerly research chemist for Ryan Aeronautical Co., San Diego, Calif. Other appointments announced by the company are: **E. W. Giddings,** vice president and general manager; **T. K. LeRoy,** general manager; **Walter Dufresne,** accounting division manager; **R. E. Medanich,** northern division manager; **M. L. Forsberg,** industrial engineer; **N. M. Shoop,** equipment sales manager; **Neil deBranch,** aircraft division sales manager; **Burton Russell,** sales promotion manager.

—o—

James B. Jamison has been named president and treasurer of the Superior Co., Beaver Falls, Pa., to succeed the late **Ernest J. Wagner.**

—o—

William J. Koenen, sales co-ordinator, Milwaukee Division, Cherry-Burrell Corp., Chicago, has been named factory superintendent. **Sidney S. Norris** has joined the corporation and succeeds Mr. Koenen as sales co-ordinator in the division.

—o—

H. Wisner Miller Jr. has been appointed sales manager of the Electric Typewriter Division, International Business Machines Corp., New York. He was formerly assistant manager of the division for the New York territory.

—o—

Edwin J. Beinecke, president of Sperry & Hutchinson Co., New York, has been elected a director of Curtiss-Wright Corp., New York. Mr. Beinecke also is chairman of George A. Fuller Co., New York.

—o—

Robert H. Ehret has been appointed assistant sales manager, Electric Products Co., Cleveland. He will be responsible for handling headquarters sales negotiations.

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Harrison C. Bristoll, general manager of the Steel Strapping Division, Stanley Works, New Britain, Conn., has been elected vice president of the company.

—o—

R. R. Donaldson has been appointed chief engineer, Hagan Corp., Pittsburgh. He had been acting chief engineer for several months since the retirement of **T. A. Peebles.**

—o—

Three new district sales managers appointed by Federal Electric Products Co., Newark, N. J., are **William M. Stark,** who becomes manager of the company's southwestern district, with headquarters in St. Louis; **George L. Stout,** manager of the east central district, with offices in Cincinnati; and **Clarence G. Landeck,** manager of the middle western district, with headquarters in Chicago.

—o—

Harold VonThaden, vice president of the Robins Conveyors Division, and a director of the parent company, Hewitt-Robins Inc., Buffalo, has been elected to membership in the Chemical, Metallurgical & Mining Society, Johannesburg, South Africa, and has also been elected to the finance committee of the New York Engineering Society. Mr. VonThaden sailed Apr. 9 on a business trip to visit the British General Electric Co., parent organization of the Frasier & Chalmers Engineering Wks., British manufacturer for Robins Conveyors.

—o—

Leslie C. Thellemann, who has been associated with Kencroft Malleable Co. Inc., Buffalo, has been elected executive vice president of the Steel Founders' Society of America, Cleveland. He had been executive secretary of Inter-Allied Foundries of New York State.

—o—

James J. Nance has been elected president, Hotpoint Inc., Chicago, an affiliate of General Electric Co., Schenectady, N. Y. He formerly had been executive

ROBERT H. EHRET

LESLIE C. THELLEMANN

Need Advice about Machining Stainless Steel? -ask EASTERN!

Stack Drilling? What drill feed should be used in drilling ⅜-in. holes through clamped stacks of 20-gage, E-S 18-8 Mo stainless (Type 316) sheets?

Bevel Milling? In beveling E-S 18-8 low-carbon stainless (Type 304) plate edges before welding, must we decrease the speed or feed of the milling cutter as the cut widens?

Hole Size for Tapping? What diameter reamer should be used on holes in titanium-bearing E-S 18-8 plate (Type 321) to be tapped for ¼"-32 threads?

Saw Tooth Set? Is any special set required in the teeth of a band saw for cutting light-gage E-S 18-8 stainless sheet (Type 302)?

Punch-Marking? Can we punch-mark drill holes in E-S 18-8 chrome-nickel plate (Type 304)? What is the best way to start holes at an angle with this plate?

Counterboring? Is reaming likely to harden E-S 17-7 Stainless (Type 301) so much that counterboring is difficult? What is the remedy?

Machining stainless, like handling any other important metal, requires the right technique. When you know how, it is simple. When you need help, get in touch with Eastern. Eastern technical men have worked with stainless so much that they have the right advice at their fingertips. There is a lot of good advice, too, in Eastern's booklet, "Eastern Stainless Steel Sheets." A copy is yours for the asking. JMLco E-E1

ask Eastern for the answer when Stainless is the question

ES

EASTERN STAINLESS STEEL CORPORATION BALTIMORE 3, MARYLAND

vice president of the corporation. He succeeds **R. W. Turnbull,** who recently was made commercial vice president of General Electric Co., Schenectady.

—o—

James Stainaker has been appointed sales engineer in charge of metal products at the eastern office recently established by Ryan Aeronautical Co., San Diego, Calif.

—o—

Stanley L. Bateman has been appointed credit manager of the Horace T. Potts Co., Philadelphia.

—o—

J. S. Hawley has been appointed works manager of the Oakland and South San Francisco plants of the California Wire Cloth Corp., West Coast subsidiary of the Colorado Fuel & Iron Corp., Denver.

—o—

J. L. Jones has been elected treasurer of Van Dorn Iron Works Co., Cleveland. He succeeds the late **A. E. Fox. Lemotta Smith** has been elected to the board of directors to fill a vacancy created by the resignation last year of **B. G. Tremaine Jr.**

—o—

J. F. Bachman has been appointed director of the industrial and machine sales department, Ford Motor Co., Dearborn, Mich. He had previously been connected with the Chrysler Corp., Detroit.

—o—

John K. McDonough has been appointed assistant to the president, Colonial Radio Corp., Buffalo, subsidiary of Sylvania Electric Products Inc., New York. **James H. Dray** has been appointed director of purchases.

—o—

Joseph P. Flynn has been appointed north central regional manager of the Crosley Division, Avco Mfg. Corp., Cincinnati. His headquarters will be in Milwaukee, and he will cover Wisconsin, Minnesota, North and South Dakota and parts of Michigan and Illinois.

—o—

John G. Wilson has been appointed vice president and general manager of RCA Victor Division, Camden, N. J., Radio Corp. of America. **Fred D. Wilson** has been named vice president in charge of operations, and **Joseph H. McConnell,** vice president in charge of law and finance for the division.

—o—

The Ferro Enamel Corp., Cleveland, has announced the appointment of four new directors to the board of the corporation. They are **C. D. Clawson,** vice president of the company, in charge of sales and research; **F. S. Markert,** vice president in charge of manufacturing; **W. B. Lawson,** president, treasurer and a director of Ferro Chemical Corp., a subsidiary of the company, and **G. W. Wallace,** comptroller and assistant secretary of the company.

—o—

Dr. Robert A. Ruehrwein has been promoted to research group leader in the central research department of Monsanto Chemical Co., St. Louis. He will be in charge of the physical chemistry research group.

—o—

William C. Yarborough has been placed in charge of aluminum sales, Little Rock, Ark., area of the Reynolds Metals Co., Richmond, Va.

—o—

E. Halsey Brister has been appointed sales manager of Bay State Abrasive Products Co., Westboro, Mass. He succeeds the late **Arthur G. Green.** Mr. Brister has been quality control manager since joining the company in 1944. He had formerly been connected with the Electro Refractories Co., Buffalo, and the Norton Co., Worcester, Mass.

—o—

Charles H. Cecil has been appointed manager of sales, Pittsburgh district, for the Bethlehem Steel Co., Bethlehem, Pa. He succeeds **James F. Kratzer,** who is retiring after many years of association with the company.

—o—

William H. Pugsley has been appointed vice president in charge of field research, Hays Corp., Michigan City, Ind. He joined the corporation in 1932 as manager of the Combustion Control Division. **Shirl M. Rudolph** has been appointed vice president in charge of sales. He has served the corporation since 1920 in various executive capacities.

—o—

Homer R. Bernier has been appointed purchasing agent for the Autoyre Co., Oakville, Conn.

—o—

Donald C. Lamb has been appointed assistant superintendent of the Taylor Instrument Co., Rochester, N. Y. He has been an executive of the company for the past 24 years.

—o—

James F. Dailey has been appointed assistant purchasing agent, National Tube Co., subsidiary of U. S. Steel Corp., Pittsburgh.

—o—

Al Jenss has been appointed manager of account services, Ampco Metal Inc., Milwaukee.

—o—

A. R. Robinson has been appointed manager of the Seattle branch of John A. Roebling's Sons Co., Trenton, N. J.

—o—

Arthur A. Atwell has been elected a director and senior vice president, U. S. Broach Co., Detroit. **E. H. H. Graf** has been elected vice president in charge of sales and engineering.

—o—

Harold F. Fulton has been appointed technical man in the New York State territory, Cowles Detergent Co., Cleveland. He will handle sales and service work for the metal cleaner department.

—o—

F. W. Toone has joined the Birmingham office of Philip W. Frieder Division, Luria Steel & Trading Corp.

—o—

W. J. Law has been appointed manager of the recently opened Baltimore sales office of Brown Instrument Co., subsidiary of Minneapolis - Honeywell Regulator Co., Minneapolis.

—o—

E. D. Anderson has joined the sales and engineering staff of Santa Fe Tank & Tower Co., Los Angeles. He will have headquarters in Tulsa, Okla. Mr. Anderson has been associated with Shell Oil Co. Inc., San Francisco, Brown Fintube Co., Elyria, O., and Cal-Fin Co. **Harold A. Dresser** has been appointed

WILLIAM H. PUGSLEY

SHIRL M. RUDOLPH

WENDELL E. WHIPP

Elected chairman of the board of directors, Monarch Machine Tool Co., Sidney, O. Noted in Steel, Apr. 14 issue, p. 80.

JEROME A. RATERMAN

Has been named president, Monarch Machine Tool Co., Sidney, O. Noted in Steel, Apr. 14 issue, p. 80

T. W. PLANTE

Appointed superintendent, Eliza department, Pittsburgh Works, Jones & Laughlin Steel Corp., Pittsburgh. Noted Apr. 7, p. 89.

to the engineering staff of the company, in charge of the Cooling Equipment Division. Associated with the company since 1946, Mr. Dresser had been affiliated with the Fluor Corp., Los Angeles.

—o—

The Alloy Division, Michiana Products Corp., Michigan City, Ind., has announced personnel changes in the Chicago and Indiana territories. **John H. Staiger** succeeds **L. J. Bohan** as representative in the Chicago territory. **William A. Zach** has been appointed representative in the Indiana territory. He had formerly been assistant chief engineer at the Michiana plant.

—o—

Walter T. Johnson has been appointed New York district sales manager, Columbia Chemical Division, Pittsburgh Plate Glass Co., Pittsburgh. He has been connected with this division of the company since he joined the firm's research department at Barberton, O., in 1930, and has been manager of the Chicago district sales office for the past three years.

—o—

William Honaker has been appointed assistant in charge of furniture sales, Reynolds Metals Co., Louisville, Ky., in the Housewares & Furniture Division.

—o—

Thomas P. Wagner has been elected president and treasurer of the Superior Drawn Steel Co., Monaca, Pa. He is a son of the late **Ernest J. Wagner,** founder of the company.

—o—

John L. Hutchinson, senior partner of Hutchinson & Co., Cleveland, has been elected president of the Lake Carriers' Association. He succeeds **A. T. Wood,** vice president and marine manager, Wilson Transit Co., Cleveland.

—o—

R. S. Poister, vice president, Crucible Steel Co. of America, New York, has been elected to a three-year term as director of the company.

—o—

William R. Howell has been appointed general superintendent, and **Mathias J. Meinen** assistant general superintendent of the Midland Works, Pittsburgh Crucible Division of Crucible Steel Co. of America.

—o—

D. K. MacLean has been appointed export manager for all lines of machinery manufactured by the four plants of the Farrel-Birmingham Co., Ansonia, Conn. He also will continue his duties as manager of the sugar mill machinery sales department.

—o—

Joseph Pfeiffer has been appointed director of purchases for Chrysler Corp., Detroit, succeeding **A. P. Hascall,** who has retired. Mr. Pfeiffer has been associated with Chrysler and its predecessor, the Maxwell Co., for more than 30 years.

—o—

S. Jay Gardiner has been appointed vice president and general sales manager, Olympic Appliances Inc., formed to serve as distributor for Olympic Radio & Television Inc., New York. **Percy L. Schoenen,** executive vice president of the parent firm, is president.

—o—

T. Pierre Champion, Champion Rivet Co., Cleveland, has been re-elected president of the company; **William J. Reilly,** secretary and treasurer; and **C. P. Diemer,** works manager. **Thomas J. Lawless** has been promoted from sales manager to vice president, sales.

OBITUARIES . . .

Lester Moehring, 55, comptroller of the Chrysler Corp., Detroit, died Apr. 11. He was also an officer and director of the principal divisions of the corporation.

—o—

Julian Richmond, 66, board chairman of the Potdevin Machine Co., Brooklyn, N. Y., died Apr. 12.

—o—

Winfield P. Hurst, 61, former president, Northern Granite & Stone Co., Cleveland, and recently associated with the engineering firm of Arthur G. McKee & Co., Cleveland, died recently.

—o—

Walter G. Macomber, 75, owner of the Macomber Machine Works, Los Angeles, died recently.

—o—

Paul Van Bolhuis, 33, assistant steel buyer for the Heil Co., Milwaukee, died Apr. 10 at his home in Burlington, Wis.

—o—

Charles Kretschman, 78, former treasurer, American-LaFrance-Foamite Corp., Elmira, N. Y., died recently.

—o—

Dr. Herbert F. Whalen, group leader of lacquer research, Monsanto Chemical Co., Merrimac Division, Everett, Mass., died Apr. 9.

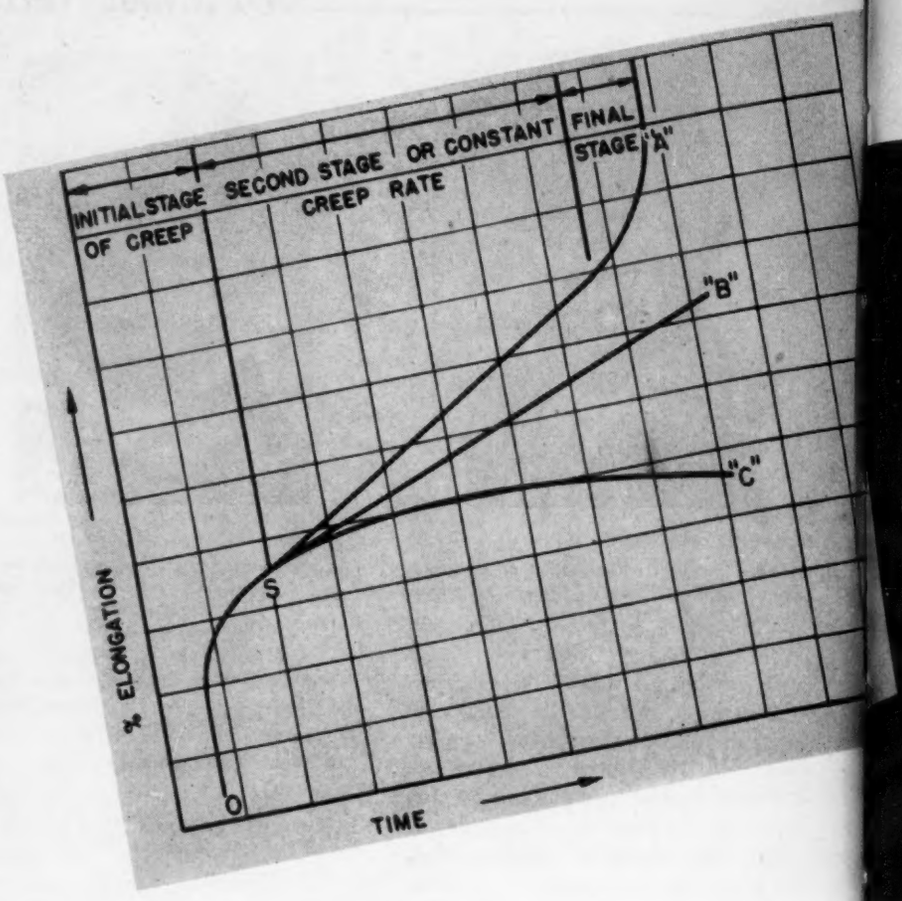
—o—

J. Eugene Neely, 50, purchasing agent and assistant secretary, Ohio Steel Foundry Co., Lima, O., died April 13. He had been associated with the company for 34 years.

—o—

Alexander Paterson, 86, co-founder of the Seneca Iron & Steel Co., and general manager and treasurer until the company merged with Bethlehem Steel Co., Bethlehem, Pa., in 1932, died Apr. 14.

EVALUATING High Heat Properties OF STEELS



Here the author discusses the significance and methods of measuring elevated temperature properties of various steels, and outlines the types of materials generally used in high temperature applications

MOST metals, when stressed at normal temperatures, show no appreciable plastic deformations if the applied load does not exceed the elastic limit. Even if they are subjected to stresses above the elastic limit, as in cold working, strain hardening is produced which hardens and strengthens the metal as long as the temperature is below that at which rapid recrystallization (softening) takes place.

At temperatures above those at which recrystallization occurs, it is found that carbon and low-alloy steels deform plastically at surprisingly low loads, instead of deforming elastically. For steel, the recrystallization temperature varies between 700 and 850° F. Some soft, ductile, low melting point materials, like lead and tin, deform plastically when lightly stressed. Lead, in fact, will creep under its own weight.

Creep is a phenomenon involving small amounts of plastic deformation over long periods of time at constant load, and often at high temperature. Although the occurrence of creep in steels and other high melting point metals was known for a long time, little was known about the magnitudes of the deformations, and its importance was not recognized until it was demonstrated in about 1922 that steel deformed slowly at red heat under stresses much lower than the values used in what was then considered good design.

The fact that creep occurs more and more readily as the temperature is increased is shown by the fact that creep is pronounced in all steels above 1200° F, but that many steels bear loads at room temperature just under the elastic limit for very long periods of time with no apparent change in dimensions. Thus, the mechanical

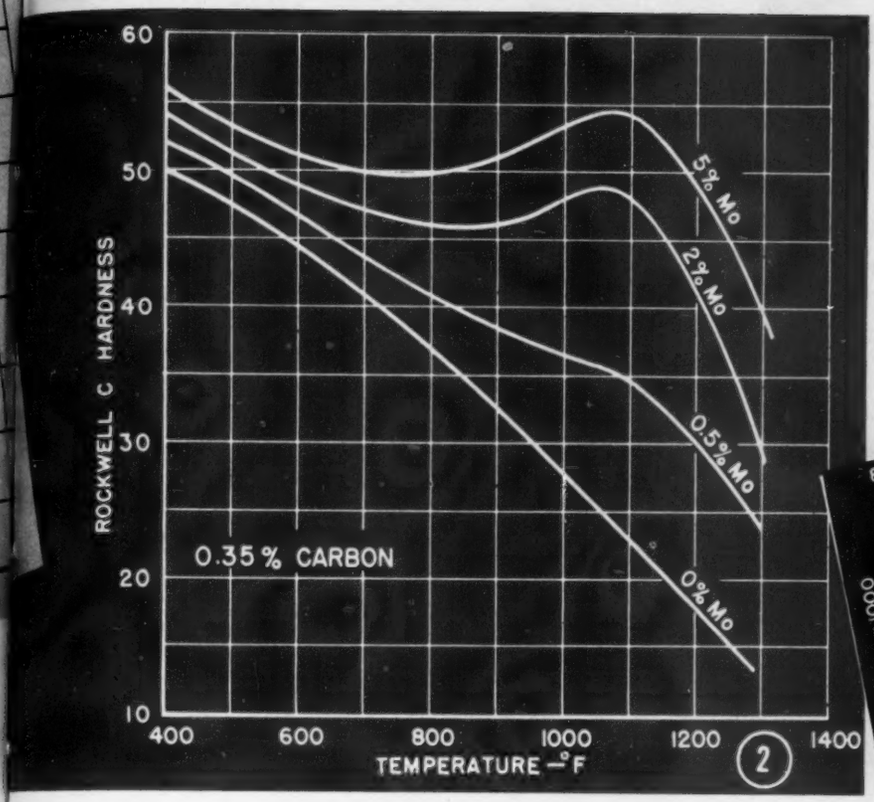


Fig. 1—Typical curves for the three stages of creep[7]

Fig. 2—Resistance to softening with increased temperatures of 0.35 per cent carbon steel as influenced by molybdenum content[3]

Fig. 3—Stress-temperature curves for rolled 18-8 stainless steel containing 0.04 per cent carbon[8]..

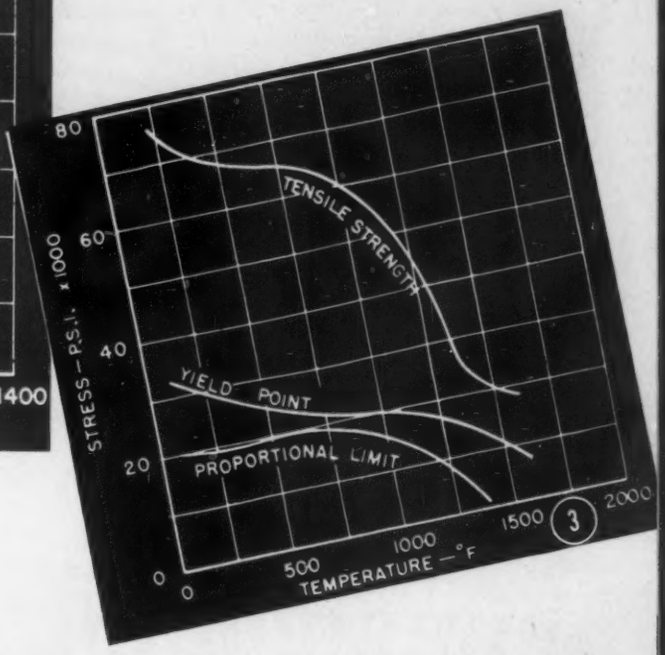


TABLE I
A COMPARISON OF THE RESULTS OF CREEP TESTS AND RUPTURE TESTS ON[7, 8] 18-8 STAINLESS STEEL

	Temperature °F.	Stress p.s.i.
Stress causing creep rate of 1%	1,100	11,550
Elongation in 10,000 hours	1,200	7,000
Stress to produce failure (rupture)	1,100	30,000
After 10,000 hours	1,200	11,000

TABLE II
COMPARATIVE SCALING TEMPERATURES OF AUSTENITIC STAINLESS STEELS[7]

Stainless Steel	Scaling Temperature °F
18% CR- 8% Ni	1650
25% Cr-12% Ni	2100
25% Cr-20% Ni	2150

properties of a steel or alloy at room temperature are not important if it is being selected for high temperature service.

In general, a metal to be used at high temperatures must meet the following requirements: (1) It should be resistant to oxidation or other attack by the hot gases (including air) which are present. (2) Its structure should be stable and not change under the stress and temperature conditions imposed. (3) Amount of distortion over the period of the useful life of the equipment should be negligible or at least harmless under the stress imposed. (4) It should withstand momentary fluctuations in temperature at normal loads, or in loads at normal temperatures. (5) It should be able to carry the load which is to be applied under normal service temperatures.

There are few materials which meet all these requirements, and the difficulty in selecting the proper material is further increased by the fact that the requirements for

By HERBERT DOBKIN
Special Projects Dept.
M. W. Kellogg Co.
Jersey City, N. J.

different parts vary greatly. For instance, turbine blades should not stretch more than 0.01 x 10^{-6} in. per in. per hour, whereas the allowable deformation in cracking coil tubes is 10^{-6} in. per in. per hour. The difficulty in determining accurately such small deformations is obvious.

Further, no simple law has been determined to describe the change in strength with temperature, and therefore a knowledge of the room temperature properties of a steel will not enable a prediction of its properties at some elevated temperature. Only a test at the elevated temperature will suffice.

Since no short-cut method has been found for evaluating creep, and since the determination of creep is difficult, expensive and time consuming, there are relatively few creep data available. The ASTM tentatively standardized a method for evaluating creep, and the equipment necessary consists of an electric furnace capable of close temperature control, and a device for holding the specimen in exact alignment in the furnace. The load is applied by dead weights through a system of levers. The loads are not greatly above design values, and the value sought is the load which, at a given (*Please turn to Page* 120)

Six-Stage Progressive Die

. . . produces entire blade sections for multivane centrifugal blower wheels, cutting costs by 30 per cent

MULTIVANE centrifugal blower wheels for heating, ventilating and air conditioning equipment are produced in 10 to 16 in. diameters by progressive stamping and spot-welding operations at the Cleveland plant of Morrison Products Inc. With a capacity for turning out more than 500 units in an 8-hour shift, the company has cut costs by approximately 30 per cent.

Wheels are of simple construction—consisting of a one-piece blade section and two end rings with integral hubs. The blade section, Fig. 1, is stamped from coiled strip steel in a progressive die operation, replacing the former fabricating technique of riveting each individual blade to the end assemblies. Weight of the wheel is said to have been reduced by 40 to 60 per cent. Inset shows construction of blade section in detail.

Manufacture of a 10-in. wheel involves 20-gage cold rolled mild strip steel, 10 13/32-in. wide which the company procures in coils weighing 3500 lb. Steel for the blade section is fed continuously from the coil handling device and straightened by a specially-designed roll feed with ratchet drive which can be set for the required length of feed. The coil handling device is driven by a sprocket

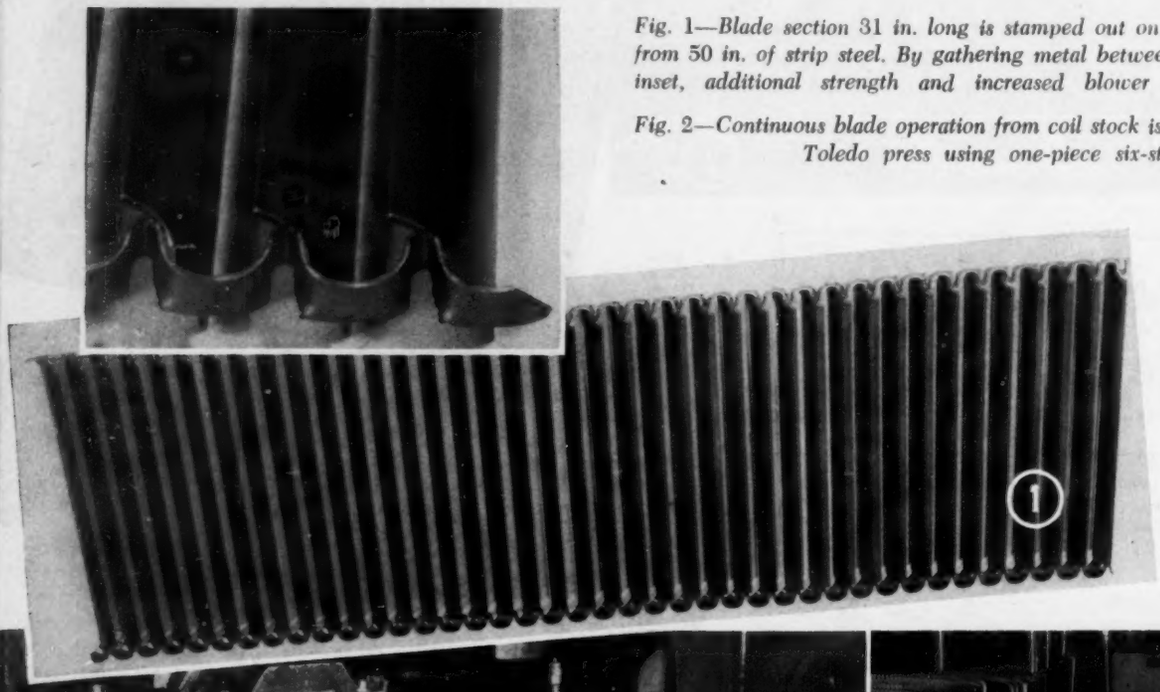
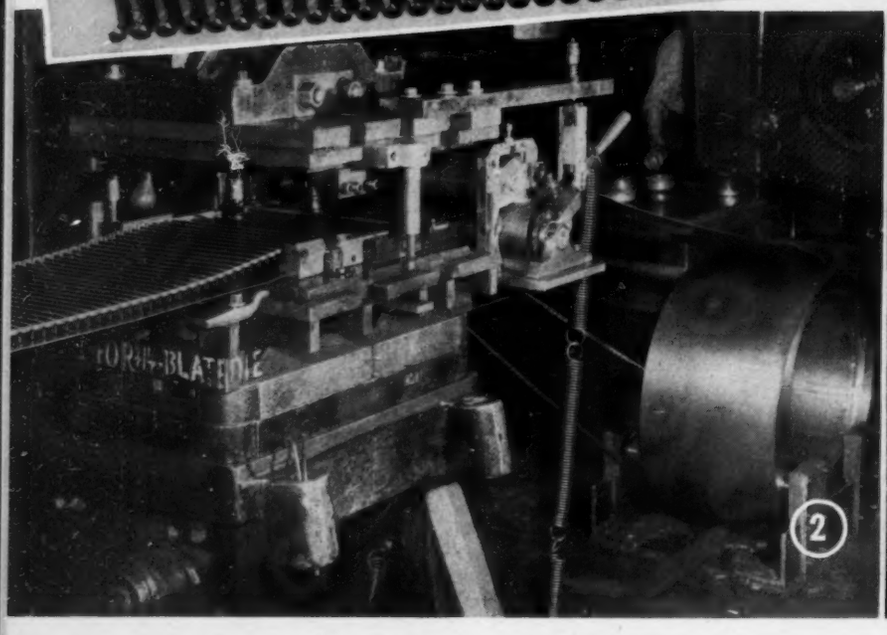


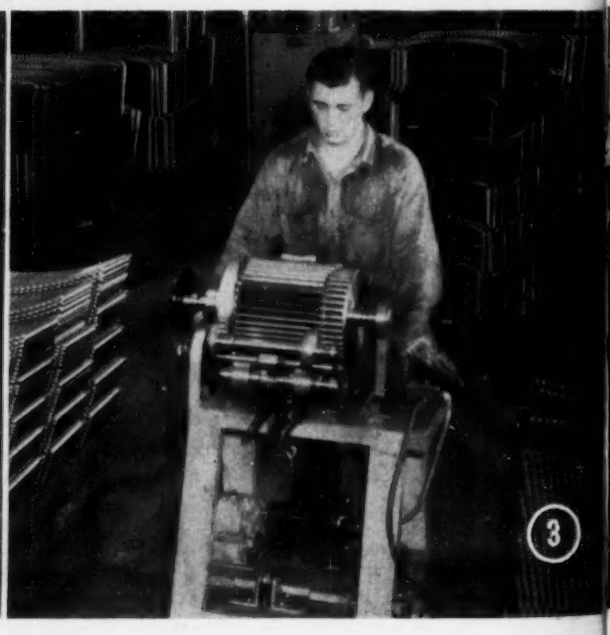
Fig. 1—Blade section 31 in. long is stamped out on progressive die operation from 50 in. of strip steel. By gathering metal between blades as shown in the inset, additional strength and increased blower efficiency are provided

Fig. 2—Continuous blade operation from coil stock is performed on this 50-ton Toledo press using one-piece six-stage dies

Fig. 3—Special rolling fixture forms sections into cylinders to conform to diameter of rim sizes, checks spacing and pitch of blades

Fig. 4—Blade sections are spot welded to end rings using a model N-12-30 Taylor-Winfield rocker arm automatic spot welder





Operation

arrangement coupled with the punch press, as shown in Fig. 2.

Vanes or blades are formed on a 50-ton straight side back-geared Toledo press equipped with one-piece 6-stage high tungsten steel dies. By successive stages worked out by the plant superintendent, Frank G. Marbach, the steel is perforated, slit, formed, flanges thrown up, blades twisted to correct pitch, and the metal between blades gathered to permit 40 blades to be squeezed into the 31-in. section. A 50-in. length of strip steel is reduced to about 31 in., Fig. 1, in the stamping process. Without interrupting production, the operator snips off sections to the proper length. Die will produce about 5000 blade sections on the 10-in. size (*Please turn to Page* 135)

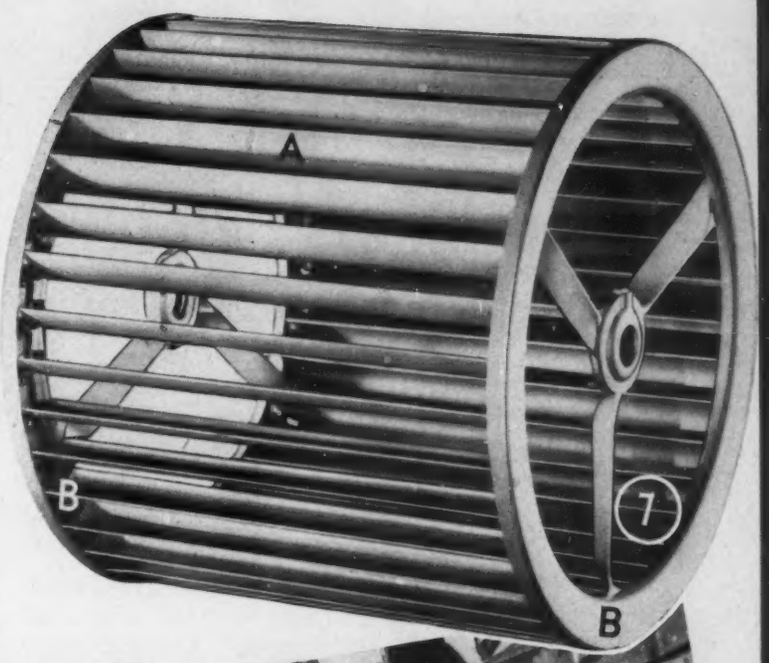


Fig. 5—In order to clear channels on rings, jig designed by company engineers is constructed to allow lateral, vertical, vertical and lateral movement of the rocker arm in one cycle

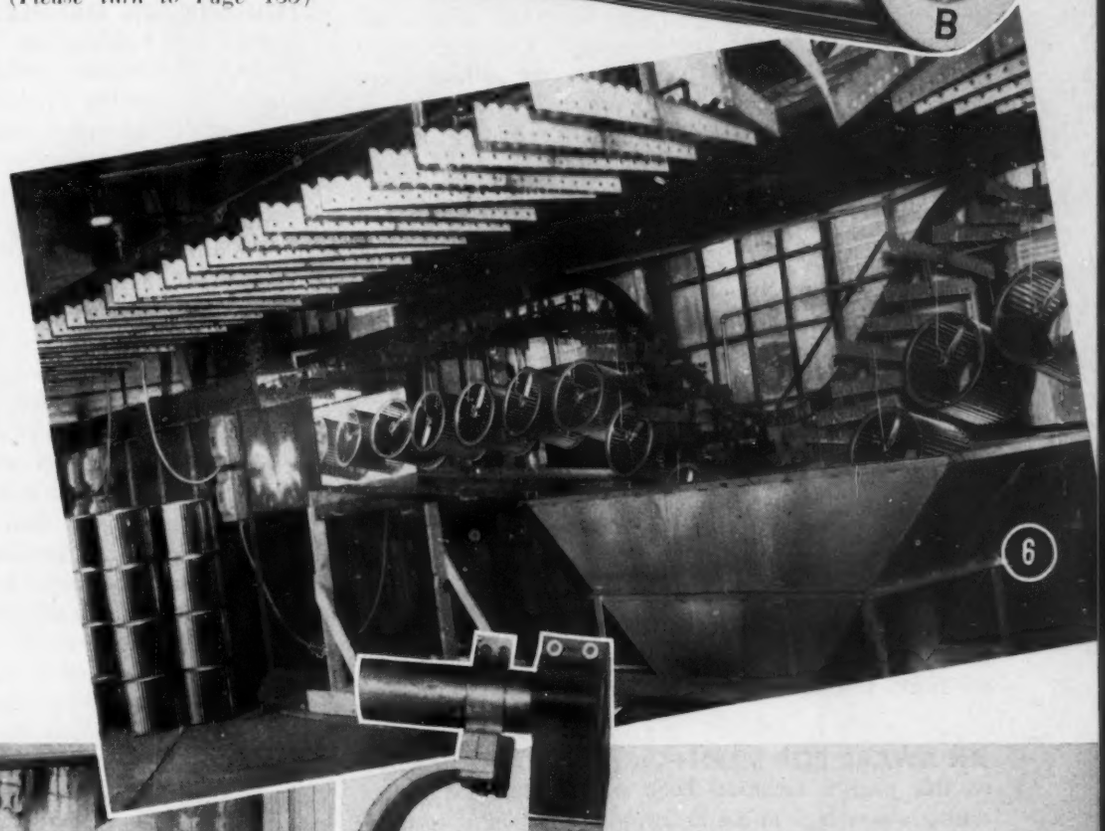
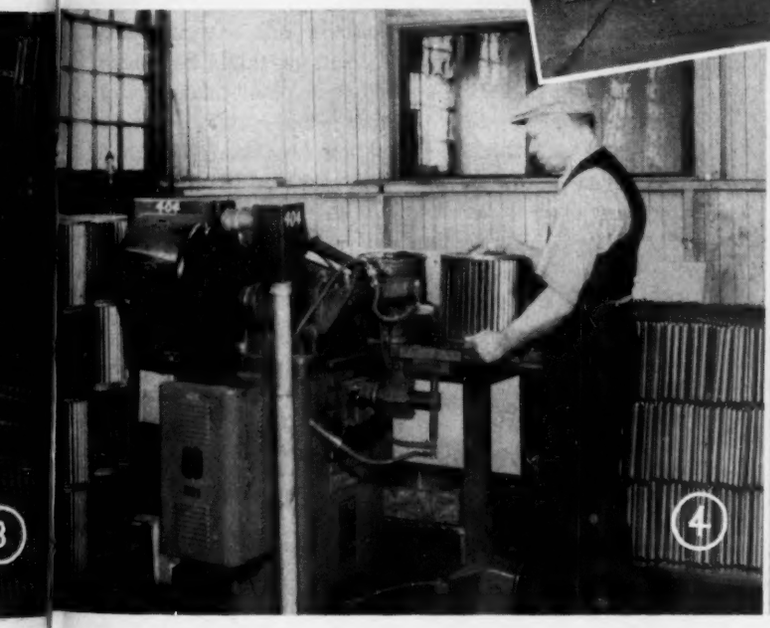
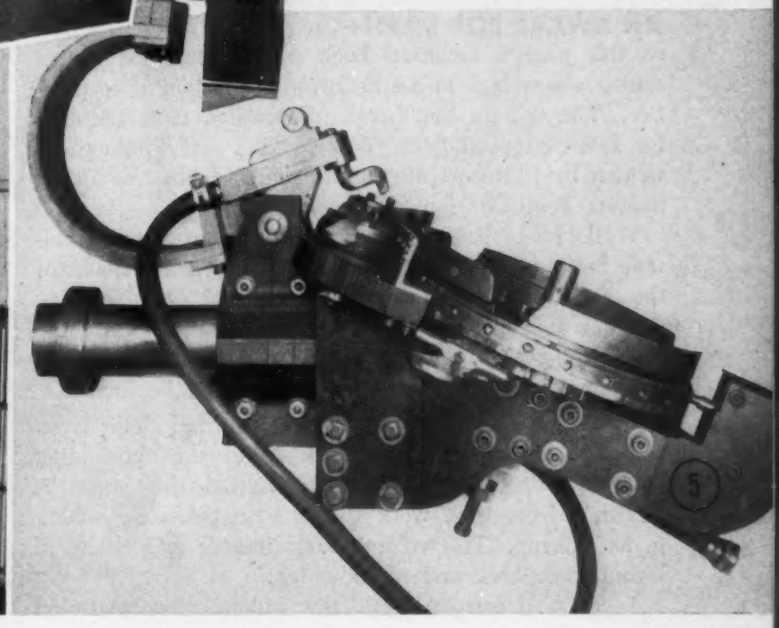


Fig. 6 — Section of paint shop, with conveyor system, 200-gal dip tank and infrared drying ovens

Fig. 7—Complete blower wheel showing: (A) One piece blade section, (B) channel-shaped end rings





Seen and Heard in the
Machinery Field

By GUY HUBBARD
Machine Tool Editor

TEXAS AND RHODE ISLAND: I returned from the ASTE convention in Houston, in the biggest state in the Union, only to immediately "take off" again for the Potter & Johnson Machine Co., in Pawtucket, in the smallest.

These two states—despite the distance separating them and their extreme contrast in size—have had a lot more in common than most people realize. Throughout the years untold thousands of bales of Texas cotton have been converted into fine textiles in Rhode Island. At the same time untold thousands of Rhode Island built machines have contributed to the industrialization of Texas.

In 1797 David Wilkinson of Pawtucket—a brother-in-law of Samuel Slater who started the textile machinery industry in America — invented a "slide lathe" which eventually was widely employed in making large screws for cotton presses used in Texas and throughout the South. However, his patent ran out before his lathe received general recognition and before he made any money out of it.

Fifty years after its invention, the Congress of the United States granted the aged Mr. Wilkinson $10,000, "for benefits accruing to the public service for the use of the principle of the gage and the *sliding lathe*". The Senate committee which recommended this deserved but long-delayed reward for this pioneer Yankee machine tool builder, consisted of Rusk of Texas, Davis of Mississippi, Benton of Missouri, Dix of New York and Cass of Michigan. Thus—a century ago—the South joined hands with the North in furthering the good cause of mechanization.

AN AWARD FOR MERIT: On January 13, I reviewed on this page a technical book which impressed me as setting a new high in the literature of machine shop practice. The title of that book is "Precision Hole Location for Interchangeability in Tool Making and Production," written by J. Robert Moore and published by the Moore Special Tool Co. Inc., Bridgeport, Conn.

While I was in Texas, news came to me that this volume has been singled out as one of the "Fifty Books of the Year" by the American Institute of Graphic Arts, this out of a field of nearly than 800 entries. En route from Houston to Pawtucket, I stopped off in New York to view the exhibition of these 50 top-ranking books.

In the words of the jury of the Institute: "This is an exceptionally fine technical book—quite the outstanding halftone printing of its kind submitted this year. A treatise on precision work should have the same quality in its makeup. This volume has brilliance and clarity of layout, presswork and reproduction."

I can well imagine that Dick Moore, who sponsored this book, Bob Moore, who wrote it, Fred Wittner, who planned and organized it, Matt Farrell and F. R. Gruger Jr., who handled the photography and art work, and the Caxton Company which printed it, all get a tremendous amount of satisfaction out of this confirmation of their theory that careful engineering, top notch materials, fine workmanship—and styling in keeping with those factors—win recognition for a book just as they do for tools, dies and machine tools. As author of its introduction, I am proud to be associated with such a distinguish group.

Now that the ice has been broken by having a tool and machine tool builder classed with the Doubledays, the Harpers, the Scribners, the Simons and the Schusters, I hope that many others in those same industrial fields will be encouraged to sponsor printed matter which in every way is in keeping with the high quality of the engineering techniques and metalworking equipment with which it is concerned. And that goes for quality of writing.

TOULMIN ON OBSOLESCENCE: For many years machine tool builders have been hammering away at the Treasury Department, and at machine tool users, to recognize the validity of depreciation schedules based on the logically estimated useful life of machines, rather than upon any arbitrary writeoff period such as that set by most comptrollers which averages 20.47 years.

More than 20 years ago I appeared before a panel of Treasury Department officials in New York in behalf of a large middlewestern company which was seeking a more sensible evaluation of its equipment for taxation purposes. Taking their equipment item by item, we were able to prove that the average period of obsolescence was more nearly seven, than 20, years. Much of this equipment actually had paid for itself within five years.

Now the machine tool builders have been joined in this effort by an influential builder of machines which shape metal by "moving it" instead of by "removing it in the form of chips." This gentleman is Col. Harry A. Toulmin Jr., president, Hydraulic Press Mfg. Co., Mount Gilead, O. Colonel Toulmin admits that comptrollers are important people, but he doesn't think that they have all the right answers—assuming that their prevailing practice regarding chargeoffs for obsolescence of machinery is a criterion. Let me quote the Colonel.

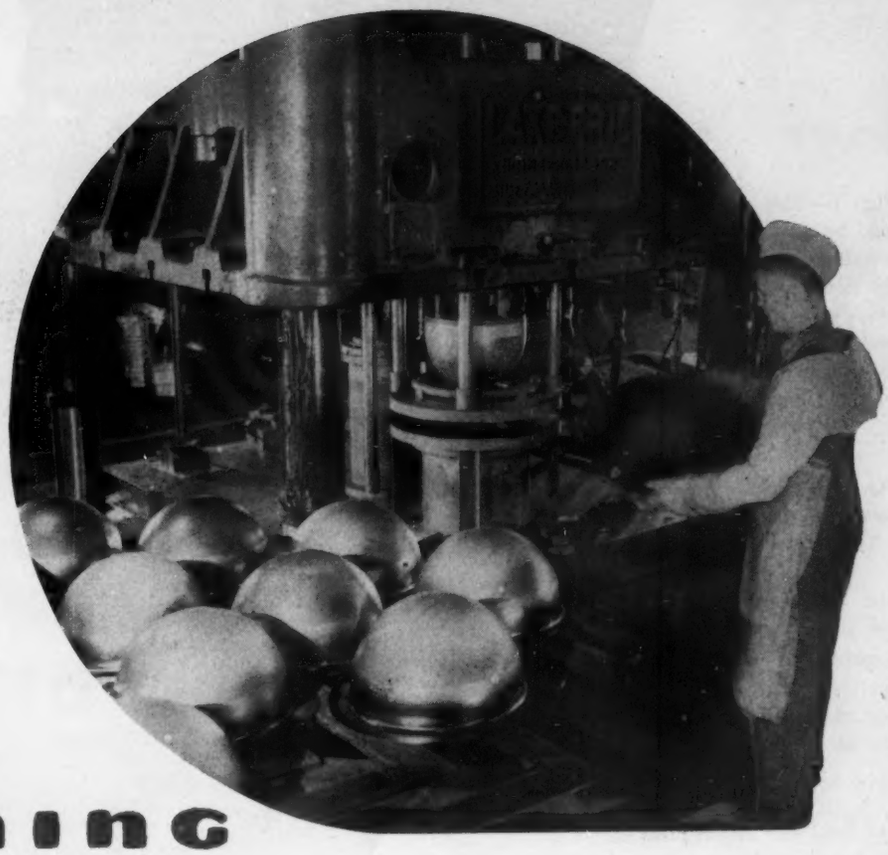
"Obsolescence and depreciation are *not* one and the same thing. Some comptrollers seem to think they are. Let me illustrate. Suppose that in your plant there stands a machine—now seven years old—that originally cost $50,000, and on which depreciation has been taken on a 20-year basis. How much is that machine worth today?

"Too many comptrollers who are 'mentally figure-bound,' will insist that this machine still is worth $32,500. As a matter of fact, that machine may be practically worthless, except for what it will bring as scrap. Why?

"The answer is simple. Obsolescence has stepped into the picture. A new method or a new design has booted that $32,500 value right out of existence. A machine is obsolete when it has ceased to do its work as well and as economically as it can be done by newer machines or newer methods. That is an operating reality—a cold, hard, demonstrable fact!"

More power to Colonel Toulmin. Builders of machine tools, presses, power hammers and all other metalworking machines, all are "in the same boat" on the tax sea.

By ALLEN G. GRAY
Consulting Editor, STEEL



Close-packed hexagonal crystal structure of magnesium makes it necessary to perform many forming operations at elevated temperatures. Otherwise same type of equipment generally used on other metals is satisfactory

FORMING Magnesium Alloys

MAGNESIUM alloys are worked in much the same manner as other more commonly used metals, and the same type of equipment generally used in metalworking establishments is satisfactory. The main difference in the tools and technique is necessitated by the fact that many forming operations must be performed at elevated temperatures.

Magnesium alloys have a close-packed hexagonal crystal form and at room temperature permissible deformation is limited. As the temperature of the metal is raised, the allowable deformation increases very rapidly so that at temperatures of 450 to 700° F (230 to 370°C) the metal may be more severely worked than most other metals at room temperature.

Although in general the working of metal in the heated state has several apparent disadvantages, there are certain advantages. Use of heat allows parts to be drawn in one operation which in other metals would require several redraws and subsequent anneals with a consequent increase in die and pressing costs. Springback is reduced as forming temperatures are increased; it is negligible at higher temperatures. The diameter of a drawn part can be controlled by temperature (*Please turn to Page* 126)

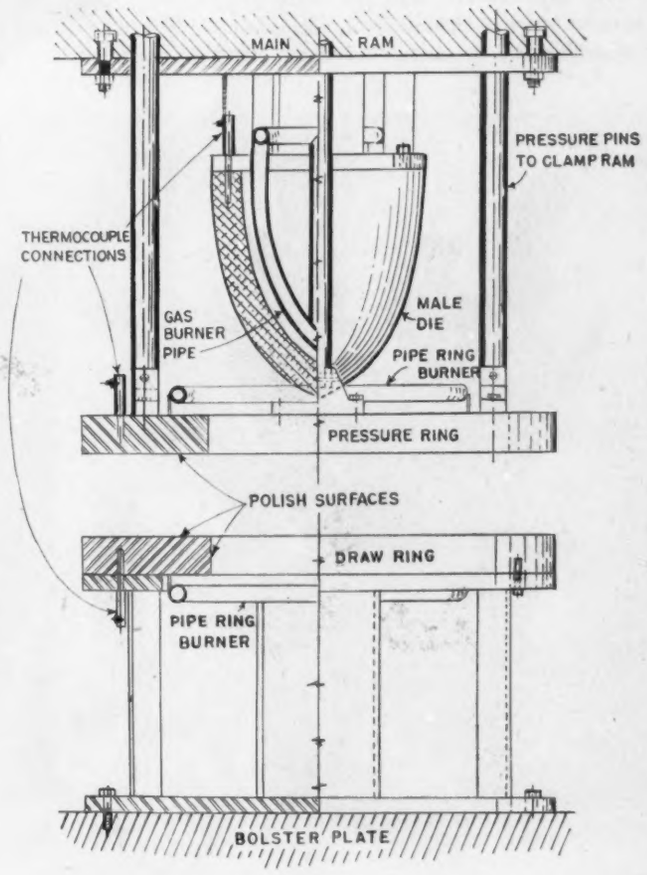


Fig. 41—Deep drawing operation on magnesium alloy parts

Fig. 42—Typical die for hot drawing magnesium alloy sheet

Making Practical Use of

Fig. 1—This casting machine may be used to make two casts simultaneously. Molten metal is poured into the casting crucibles on the casting arm, or metal is melted in crucibles by oxygen torch. Rotation of arm transfers metal from crucibles into refractory molds

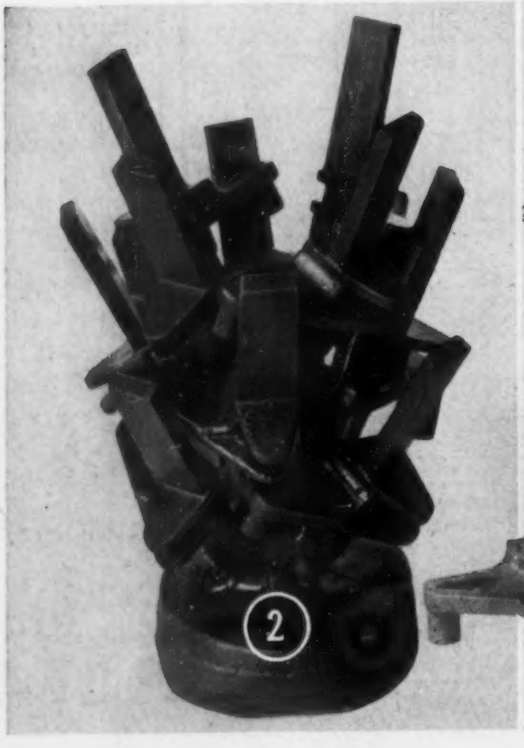
Fig. 2—Typical arrangement of wax patterns of an industrial part ready for investing

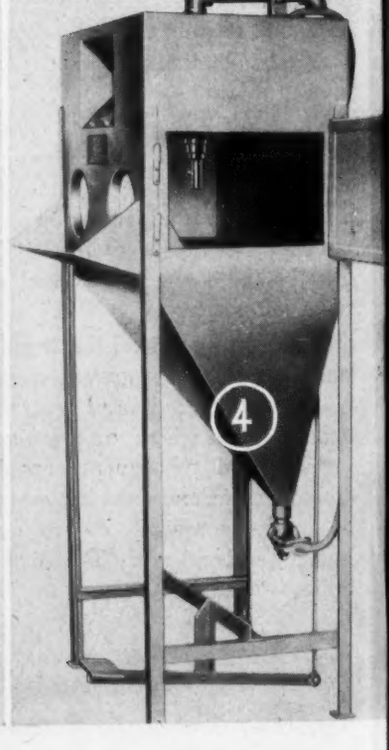
Fig. 3—Kerr Vacumatic, cabinet model, for exhausting air from the investment mix

Fig. 4—Leiman sand blast machine for cleaning and finishing precision castings

Fig. 5—Preco 20-ton press shown here equipped with over-size platens, is used to form soft metal dies

Fig. 6—Demonstration unit showing, left to right: Small melting furnaces; small gas-fired burn-out furnace with Brown indicating pyrometer controller; Ecco M34-B high frequency melting and casting machine, motor driven; Ecco 10 kva high frequency converter, from which power is taken to melt metal on casting machine





By ALEXANDER SAUNDERS
Partner
Alexander Saunders & Co.
New York

Precision Investment Casting

Step by step the author reviews latest methods and equipment used to produce small ferrous and nonferrous castings of undercut or intricate design, weighing as much as 5 lb and up to 6 in. in length. Procedures detailed are die-making, pattern-casting, heating, prepartion of refractory mold, casting and final cleaning

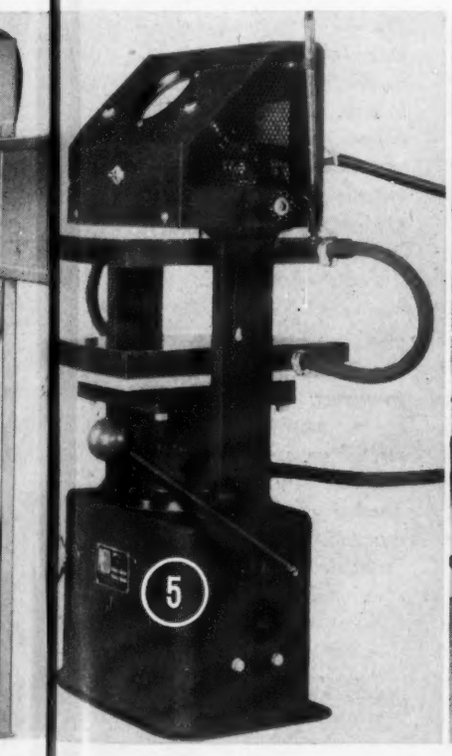
PROCESS of precision investment casting was developed during World War II to produce various small pieces which were difficult to manufacture in sufficient quantity by conventional methods. War conditions justified the acceptance of high costs. The experience gained was great, and it is now being put to advantageous use for industrial production.

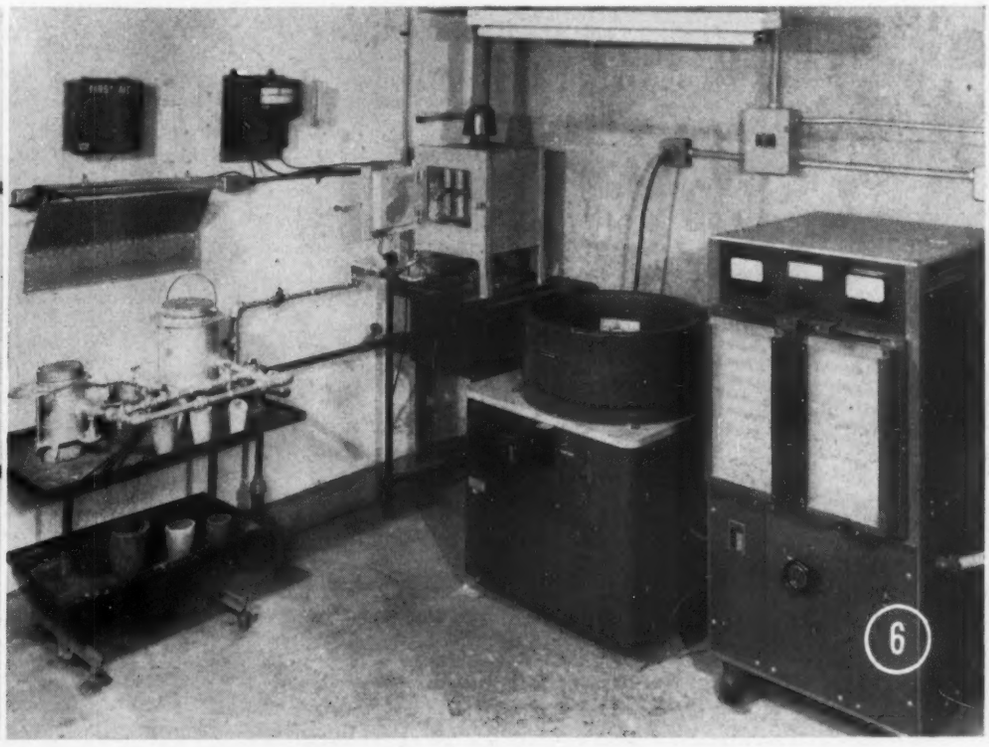
Precision investment casting is being done by a number of companies on a custom basis for the trade. These firms are located in various parts of the country and already constitute an important source of supply for castings. Manufacturers of machinery containing intricate parts may find it advisable to buy castings from such established custom casters, just as they now obtain forgings, static castings and other parts from specialty suppliers.

Other large manufacturers established their own precision investment casting departments to produce pieces for their own use. A large textile machinery firm, for example, uses precision investment casting to produce sewing machine parts. Formerly, these were formed by hand by skilled operators, not replaceable, who had served a long and patient apprenticeship.

Experience with the process indicates that it may be applied advantageously when these conditions exist: 1. When an intricate part is to be produced which would otherwise require an uneconomical series of machining, forging or rolling operations; 2. when small undercut parts are required which are too complicated in shape for powder metallurgy; 3. when parts are required in too critical dimensions or finish for sand casting; 4. when limited volume or high temperature of the metal does not permit use of die casting.

Recent metallurgical progress has developed many heat resistant alloys of extreme hardness. Machining of such alloys presents an especially difficult problem. Precision casting overcomes this difficulty as these parts now can be





cast to close tolerance, reducing machine time to a minimum.

Present production of precision castings ranges from very small parts to pieces weighing as much as 5 lb each and up to 6 in. in length. Range of metals is complete from aluminum, magnesium, bronze, beryllium copper and other nonferrous alloys through the ferrous alloys, and carbon steels to the high chrome-nickel combinations.

The process is particularly interesting where intricate undercut shapes are to be produced; it may often be used to produce a formerly assembled part as a single piece.

For example, a piece now being produced is a slotted holder in which seven precisely aligned holes are made. By precision investment casting the entire piece with the required holes is produced in one operation. Other pieces include a variety of lugs and cams.

Investment materials developed for precision casting are accurate in their expansion when put through the correct burn-out cycle. Production today is being accomplished on the basis of maintaining critical dimensions of plus or minus 0.002-in. and in some instances even closer tolerances. The overall surface characteristics of precision castings show a fine finish which requires a minimum of pickling, sand-blasting or other cleaning operations.

An overall advantage of the precision investment process is that centrifugal castings are compact, with a better grain structure and therefore of greater strength. Controls of pressure through variation in the force applied and control of cooling of the molds into which the metal is cast result in unusual soundness and excellence of structure.

The process, briefly stated, results in the production of a casting of undercut or intricate design and of critical dimensions. The first step is to make a die in which patterns of the piece to be cast may be formed in wax or other volatilizing material. These patterns are grouped together and are embedded or "invested" in a refractory material, referred to as the "investment".

Investment is hardened to form a mold and then put through a heat cycle. This results in the melting or burning out of the expendable pattern and the preparation of the refractory mold to receive the molten metal. The metal is cast by centrifugal action, or other forceful means so that the mold is completely filled and a strong dense casting is obtained. The re- (*Please turn to Page* 117)

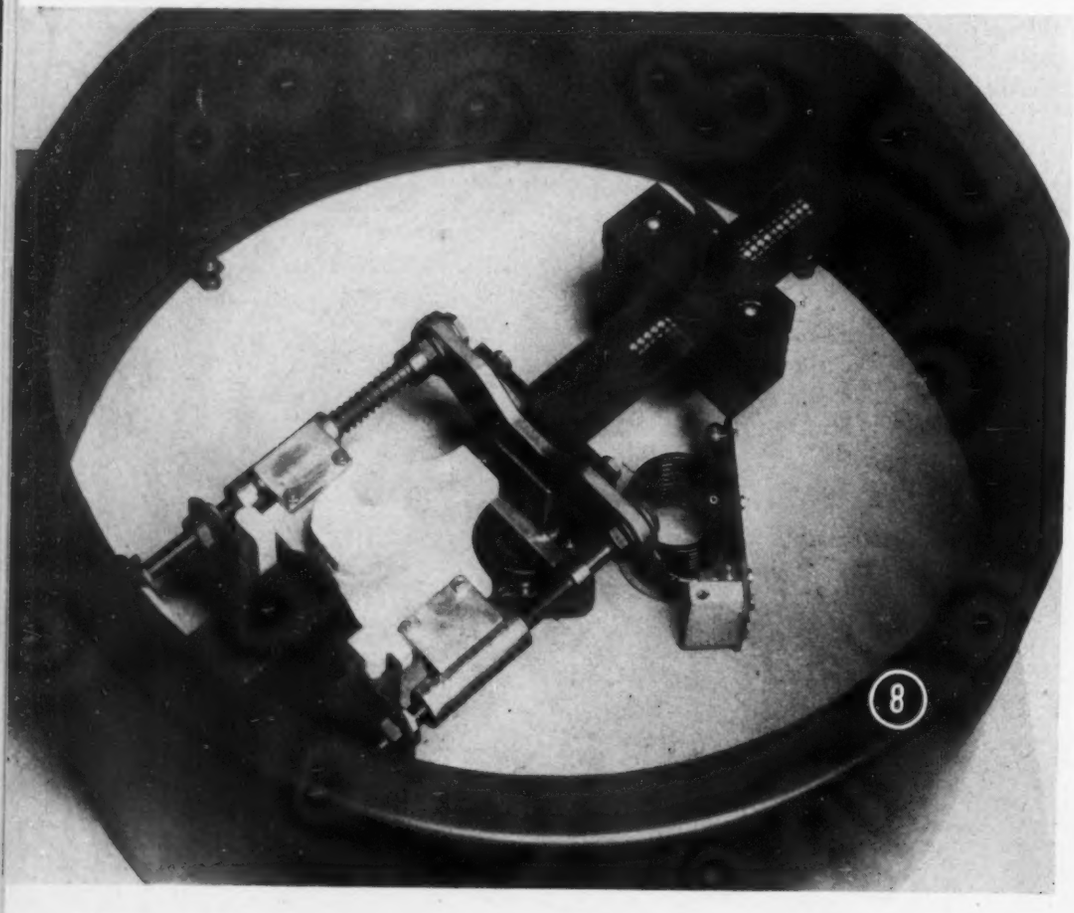
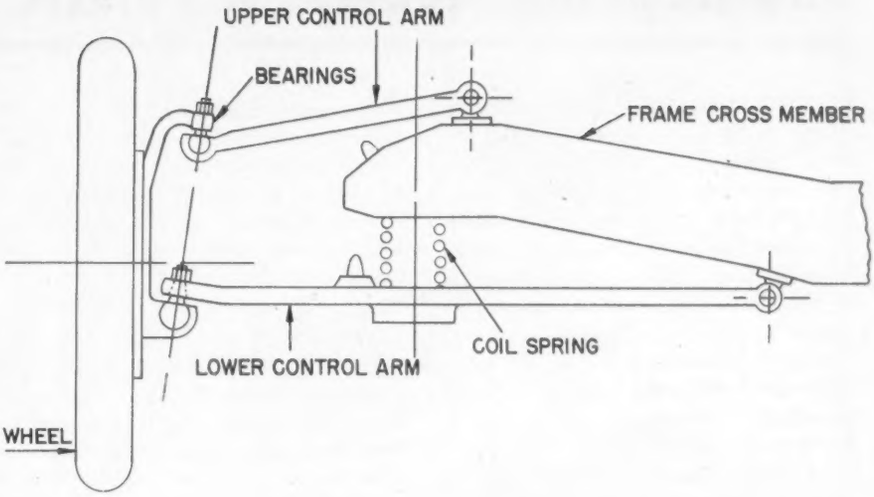


Fig. 7—Variety of intricate shapes in steel, magnesium, aluminum, bronze, beryllium and copper, all produced by precision investment casting methods. These parts are supplied by J. R. Wood Products Corp., Brooklyn, N. Y.

Fig. 8—Ecco M34-B high frequency melting and casting machine. Metal is melted on arm of casting machine by high frequency coil surrounding crucible. When cast is to be made, coil is dropped clear and arm is rotated



INDEPENDENT

Front Suspension System

Improves Car Roadability

ADAPTATION of a basic type of bearing, produced for over 30 years, to the redesign of automotive independent front suspension systems gives promise of effecting appreciable reduction in unsprung weight, lowering cost, improving car roadability and the "feel" of steering, as well as lessening tire wear and eliminating lubrication and reducing maintenance.

Essentially, the bearing, of the ball and socket type, comprises a socket or cup lined with a compressed impregnated fabric into which is fitted a smoothly finished spherical or ball member. Nature of the impregnation—a stearic acid compound—is such that in the turning and oscillation of the ball member in the cup, static and dynamic friction are approximately the same under normal temperature conditions. In addition to the low friction, the bearing has high load carrying capacity.

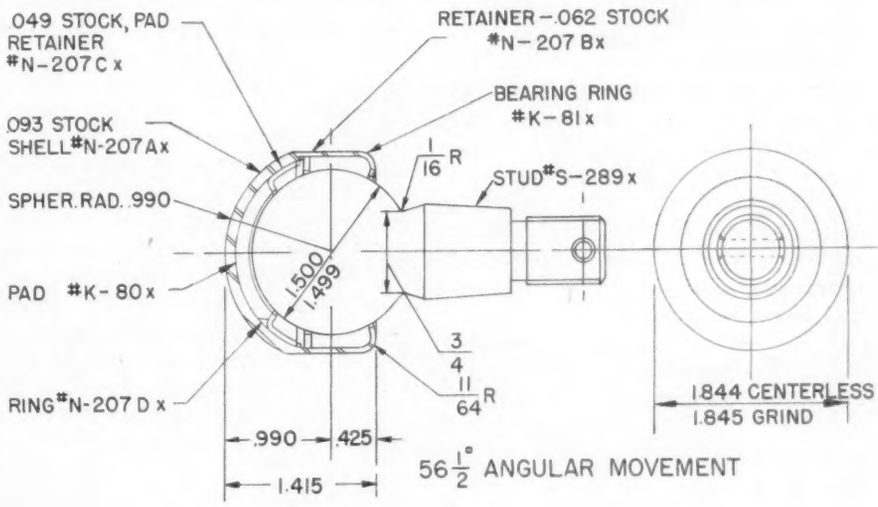
A similar type of bearing has been used for years in Ford shackle bearings; it includes a stud with concentric grooves, 0.020-in. deep and with 100-degree included angle, wrapped with the impregnated fabric and forced into a steel shell of sufficiently small diameter to effect a 20 per cent compression of the fabric. End of the shell is flanged over to complete the bearing assembly.

Kingpin Eliminated

As designed into the front suspension system, two of the ball and socket bearings, upper and lower, are used. The conventional kingpin and knuckle support are eliminated in favor of a knuckle forging comprising the wheel spindle and housings for the upper and lower ball and socket bearings. Steering arm is bolted to the lower part of the knuckle forging. Control arms of the suspension system terminate in the ball elements of the bearings. Thus two ball and socket bearings replace seven conventional bearings at each front wheel—upper and lower radial bearings and ball thrust bearing on the kingpin, and two bushings on each side of top and bottom control arms.

In the system for a typical 4000-lb passenger car, diameter of the ball member is 1¾-in. in the lower unit, 1½-in. in the upper. Sphericity of the ball is held to 0.0005-in. tolerance by a specialized manufacturing method. This is important to avoid a camming action on the fabric lining should the ball be out-of-round. The bearing pad in the cup or retainer is die compressed 30-33 per cent and staked into the formed steel shell. Tightness of the ball in the lined shell is measured in inch-pounds of torque required to turn it. A typical setting is 3-5 in-lb.

Precautions must be taken to exclude dirt and moisture from the bearing and it is usually the practice to fit rubber boots



over the joint. Beyond this it is advisable to have a corrosion resistant surface on the ball member since there might be some condensation possible inside the seal. One way this has been accomplished is to hot spin a thin sheet of Monel metal over the ball. Plating with various corrosion-resisting elements offers another possibility and considerable research has been directed along this line.

Pioneer in the development of this novel type of bearing is the O & S Bearing Co., Detroit, of which A. W. Kogstrom is chief engineer. The company is currently engaged in co-operating on field tests of the bearing with a number of automobile manufacturers, also maintaining a research laboratory and staff at the University of Michigan, Ann Arbor, Mich.

The bearing has been produced in a variety of sizes and forms, with ball diameters ranging from ¼ up to 4¼-in. It has been adapted to truck radius rods; the Fruehauf torsion bar suspension system for trailers was designed around the bearing, life tests up to 300,000 mi having been made in the latter installation with no signs of failures.

—o—

Straight oil gages, machined from hexagonal bar stock, combine unlimited visibility and plastic sights, an independent nut locking the unit together. Built by Oil-Rite Corp., 3409 South 13th street, Milwaukee 7, gages range in size from 2½ to 5 in. Plastic sights are virtually unbreakable. Gages can be taken apart for cleaning by removing only the top nut.

Engineering News *at a Glance*

PRINTED ELECTRIC CIRCUITS: By means of the printing process the electronic circuit of a conventional radio—now characterized by a maze of wires, resistors, inductors and condensers—may be replaced by a compact circuit printed on an insulated surface, eliminating much of the third dimension and making it simple to check and repair. National Bureau of Standards developed the techniques involved in the printing, with cooperation of electronic manufacturers of the tiny generator-powered radio proximity fuze. According to the agency, other specific applications for the development lie in the fields of pocket radios, personal radio telephones, miniature hearing aids, meteorological instruments and various miniature electronic control circuits.

SHAVES MARINE GEARS: Taking a lesson from automotive and aircraft gear experts, marine gear engineers are using a gear shaving method to obtain better finishes on gear teeth. Idea of taking a thin slice from the surfaces of the teeth after they are formed by hobbing, is being applied by Westinghouse at its South Philadelphia Steam Turbine Division to the big gears used for aircraft carriers—these measure 8 ft in diameter and are capable of transmitting several thousand horsepower. After considerable development of the shaving technique, it is now possible to obtain full-face contact without recourse to lapping or other means. Furthermore, hobbing feeds and speeds are increased as much as 50 per cent without sacrifice of accuracy, but with a somewhat rougher surface finish than can be corrected by shaving.

TUBING IN QUANTITIES: From Union City, N. J., Callite Tungsten Corp. reports it is now producing seamless molybdenum tubing in commercial quantities for the first time. It is made in sizes 0.040 to 0.500-in. OD, and in lengths up to 9 in. Other diameters, however, are made on special order. According to the company, the tubing can be machined readily, welded to iron nickel and similar materials, and is easily worked and shaped within reasonable tolerances.

OPERATES NEW LAB: Chrysler Airtemp's new research laboratory is now in full operation, it was learned in Dayton recently. It combines production and testing of heating, commercial refrigeration and air conditioning equipment under one roof. The lab consists of special hot rooms, coal, oil and gas-fired testing rooms, fuel analysis chamber, component-parts testing rooms, a calibrating and performance test room for both small and large compressors, two rooms for testing equipment requiring large amounts of outside air, two double rooms for checking room coolers, huge cold rooms and adequate area for testing all types of equipment for endurance.

HEAT FOR MOTORISTS: South Wind Division of Stewart-Warner Corp. reports from Indianapolis that the under-the-hood heater installations, long-advised by auto makers, are now available for all types of motor vehicles. Said to be the only automotive heating system that combines instant heat with automatic thermostat control and fresh air ventilation, the unit can operate entirely independently of the engine. It has enough heat capacity to heat two full-size rooms. Ventilating air is completely changed every few minutes as over 100 cubic feet of warmed air is circulated by the unit every 60 sec.

MINIATURE PLATING INSPECTOR: Miniature plating unit, manufactured by R. O. Hull & Co. Inc., Cleveland, enables a plating operator to observe test plating characteristics of brass, cadmium, chromium, copper, nickel, silver, tin and zinc. It is said to produce a cathode deposit that records the character of electroplate produced at all current densities within the operating range. According to the company, the unit allows experienced operators to determine the approximate limits of bright current density range; approximate concentrations of primary constituents such as cadmium content, sodium cyanide content, nickel metal content, addition agent concentrations and metallic impurities.

OXIDE PROTECTION: In pointing out German anodic oxidation methods for forming a protective oxide film on aluminum and aluminum alloy products, a report issued by the Office of Technical Services, Washington, states that in 70 per cent of all cases companies use a sulphuric acid bath as the electrolyte and a direct-current source as the power supply. At Stuttgart, Gebruder Schoch Co. favors use of alternating current with sulphuric acid in anodizing porous sand castings. This helps reduce pitting and produces a soft ductile film. For ductile oxide coatings on aluminum-copper alloy castings, the company uses oxalic acid for the electrolyte and alternating current of relatively high voltage. The Mahle Corp., in the same city, observed that pistons receiving anodizing treatment were not corroded by leaded fuels. The treatment, however, was used primarily to reduce carbon accumulation on pistons and to help prevent scuffing.

FAST BAR INSPECTOR: Uniformity of ferrous tube and bar stock produced by Bethlehem Steel Co., is determined visually by continuous magnetic analysis with equipment supplied by Magnetic Analysis Corp., Long Island City, N. Y. As the tubes or bars are passed through the electronic analyzer, defects such as longitudinal or transverse cracks, seams, slivers, as well as differences in heat treatment, hardness and structure of the metal are indicated to the inspector who watches the pattern on the face of a cathode ray tube. Material is passed through the magnetic analyzer at production speeds.

ANTI-FIRE BOOTH: Fire just doesn't stand a chance in the finishing spray booths currently manufactured by Schmieg Industries Inc., it was learned in Detroit recently. In action, overspray is whisked away in a swiftly-moving stream of air that travels horizontally from the work into a solid curtain of water that cascades down a perpendicular flood sheet at the back of the booth. Merging with this water curtain, the pigment in the air stream is whirled under the perpendicular flood sheet into a veritable tornado of swirling, churning water and hurled with terrific force against the impingement wall of the unit. The centrifugal pounding action set up in the washing chamber effectively dislodges the pigment from the air stream. A second sheet of water, descending down the rear wall, floods it into the sludge tank below.

KEEPS TRUCKS MOVING: To keep a fleet of industrial trucks supplied with charged batteries, Ingalls-Shepard Division of Wyman-Gordon Co., Harvey, Ill., operates two battery shops, each equipped with modern facilities for exchanging, watering and charging batteries. Power hoists suspended from trolleys on bridge cranes are used for exchanging operations. They are of the load-cable type having no dangling ends. Distilled water is produced by gas-burning stills, and is stored in elevated 30-gal tanks from which it is piped to hose connections for electric fillers which are located at convenient intervals beneath the charging benches. In one shop, 12 circuits are provided for 28-cell batteries and, by means of a switchboard, any circuit may be connected to any of 24 outlets. In the other shop, 24 circuits suitable for the same size batteries are provided.

5 REVERE METALS Meet Strict Lock Requirements

★ ★ ★

Here is an example of the manner in which the wide variety of Revere Metals permits exact specification. In the manufacture of this lock *five* Revere Metals are employed. Here they are:

1. 70-30 Cartridge Brass for the dial flange
2. Commercial Bronze, 90%, for case, case lid and bolt
3. Heavy Leaded Brass for tumbler parts and other items, including dial, requiring exceptionally accurate machining
4. Free Cutting Brass in Rod and Extruded Shape, for the machined and knurled head, and for the angle bar
5. Forging Rod, for the tumbler driver

Selection and employment of these metals enabled the manufacturer to meet the many different requirements of fabrication methods, and at the same time assure strength, long life and reliable operation. Revere Metals perhaps can do as much for your own product. For cooperation in the choice and use of these metals, ask about the Revere Technical Advisory Service. Revere supplies mill products as follows: *Copper and Copper Alloys:* Sheet and Plate, Roll and Strip, Rod and Bar, Tube and Pipe, Extruded Shapes, Forgings —*Aluminum Alloys:* Tube, Extruded Shapes, Forgings—*Magnesium Alloys:* Sheet and Plate, Rod and Bar, Tube, Extruded Shapes, Forgings.

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230 Park Avenue, New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

Mosler combination lock, most of its parts fabricated of Revere Metals. Made by The Mosler Lock Company, Covington, Ky., the lock manufacturing division of The Mosler Safe Company, largest builders of safes and vaults in the world.

"Hot Hard" HIGH SPEED STEEL

By H. G. JOHNSTIN
Metallurgical Engineer
Vanadium-Alloys Steel Co.
Latrobe, Pa.

. . . offers requisite wear and heat resistance imperative for successful cutting of materials of higher hardness at elevated temperatures developed in service

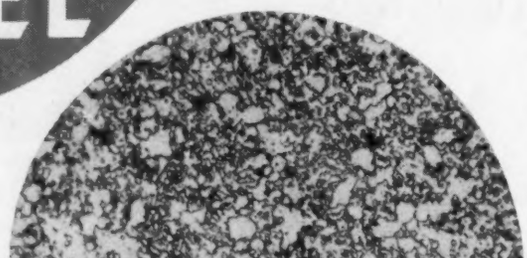

Fig. 1 (left)—Structure of hardened specimen of Vasco Supreme; heat treating cycle used was: Preheat temperature, 1450° F, quenched in oil from 2280° F and drawn at 1000° F. X 500

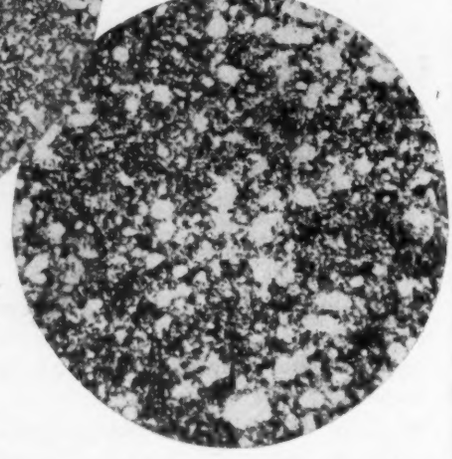

Fig. 2 (below)—Microstructure of annealed specimen. X 500

CHARACTERIZED by its ability to cut materials of high hardness, its resistance to wear, and hot hardness and in hardness as produced from heat treatment, a patented cutting material has been recently announced by Vanadium-Alloys Steel Co., Latrobe, Pa. This high speed steel has a carbon content of 1.50 per cent, a vanadium addition of 5 per cent, and incorporates sufficient amount of cobalt to further improve the hot hardness qualities. The high carbon content promotes increased wear resistance and high hardness from heat treatment; the large vanadium content prevents brittleness, contributes to edge strength and increases the hardness of the material at elevated temperatures developed in service.

While commonly used high speed steels are capable of acquiring hardnesses greater than 65 rockwell C with exercise of proper care in heat treatment, they are not however placed in service at hardnesses greater than 66 rockwell C and the great majority of tools are employed with working hardnesses under 65 C. The ease of attaining hardnesses higher than these with this material, which is called Vasco Supreme, is one of its important attributes because it permits putting to use quantity lots of tools at a hardness specification of rockwell C 66-67. When necessary, hardnesses lower than this figure may be successfully employed.

Cutting tools made of high carbon-high vanadium alloy should be heat treated to the highest obtainable hardness except in those cases where maximum toughness is required in preference to maximum cutting efficiency. To obtain maximum hardness, preheating to 1450°-1550° F followed by transfer to a high temperature furnace at 2250°-2300° F is recommended, depending upon the type of furnace used, the type of tool and its size. Tool bits and similar single edge tools used for heavy duty cutting should be heated to 2300° F if a controlled atmosphere furnace is used, 2260° F in a salt bath. A slightly lower temperature may be used for fine edged tools, although a temperature below 2260° F is not recommended for obtaining maximum hardness.

Preheating should be for a sufficient time to insure release of machining or other cold working stresses. A slight soak at the quenching temperature will aid in securing a hardness of rockwell C 67-68 possible in this steel, but care should be exercised to avoid undue soaking, particularly with intricate tools such as shell mills. Oversoaking may cause hardening cracks as the result of excessive stresses developed from the movement caused by oversoaking.

Quenching may be either in air or oil. The tempered hardness in tools cooled in still air will be about one rockwell point less than for tools quenched in oil from the same temperature. Oil quenching is preferable since scale formation is held to a minimum in addition to the slightly higher hardness to be expected.

Vasco Supreme has a slight tendency to decarburize when heated and, although decarburization developed in hardening will be less than that encountered with standard cobalt or high molybdenum grade high speed steels, tools which cannot be ground after hardening and tempering should preferably be treated in a salt bath or controlled atmosphere furnace. If a semi-muffle type furnace is used for such tools, pro-

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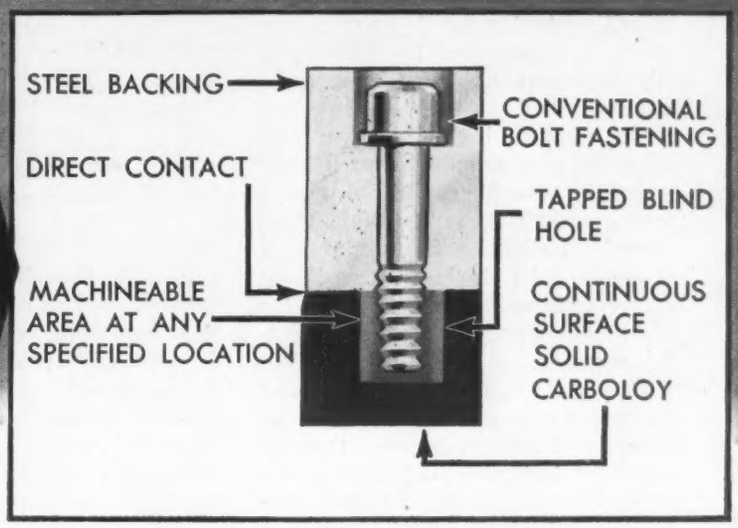
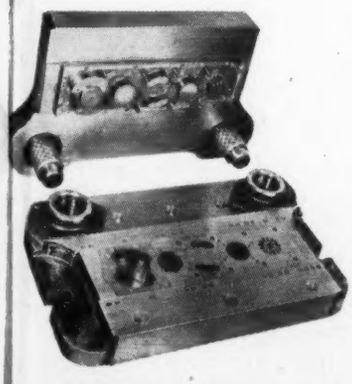


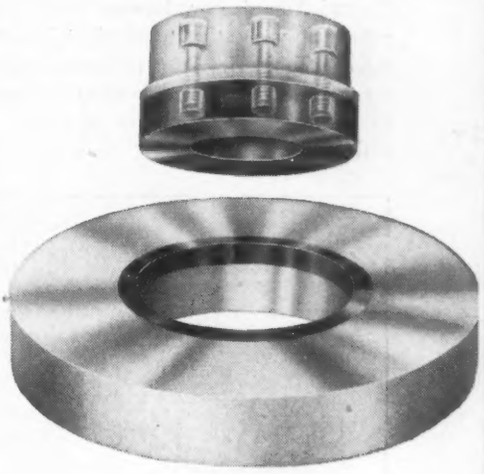
ew Mounting Method Provides ninterrupted Carboloy Surfaces y Bolting to Tapped Blind-Holes

ew—**exclusive** . . . this Carboloy-developed mounting-ethod tremendously widens cemented carbide's range f usefulness!

arboloy Cemented Carbide sections are supplied to your pecifications, already equipped with machineable inserts hich may be drilled and tapped for bolting into place. ery large sections of carbide can now be easily mounted here needed. By blind-tapping, "through holes" are liminated, giving continuous uninterrupted surfaces.



5-STAGE CARBOLOY PROGRESSIVE LAMINATION DIE, in which the female members for the first, second and third stages are attached to the steel die block by the new method. Points of attachment are indicated by lighter-toned spots above stud locations. The large carbide punch for the first stage and the two punches for the third stage are also attached by this method. All working parts of this die set are of Carboloy Cemented Carbide, including dies, punches and guide and locating pins.



CARBOLOY PUNCH AND DIE SET shown here illustrates how studs are used to attach carbide to mounting. This gives a solid steel backing for the carbide punch, greatly increasing its ability to resist shock.

Direct contact of carbide with back-up metal increases impact resistance. Users can specify desired locations o attachment points, and drill and tap inserts in their own shop.

Typical of the range of applications are: Wear parts or fixtures, machine ways, guides, work rests and shoes, com pound, progressive and segmental dies, crank guides, can liners, punches, wear plates, and many others. For further details, write: Carboloy Company, Inc., 11139 E. 8 Mile Ave., Detroit 32, Michigan.

CARBOLOY CO. INC.

11141 E. Eight Mile Ave. Detroit 32, Mich

* CARBOLOY (TRADEMARK) CEMENTED CARBIDE

SHEET METAL DRAWING AND BLANKING DIES

tection against decarburization by means of a spray coating of copper base paint such as Sel-Car or No-Carb is recommended. Tools which will be sharpened by grinding both sides of the cutting edge need no protection against decarburization.

Table I illustrates the hardness attained after quenching in oil from 2275° F and tempering for 2 hours at the indicated temperatures. Double tempering is recommended for tools made from this alloy. In the event maximum hardness has not been obtained, a third tempering may produce increased hardness if the austenitic condition developed from quenching has not been fully transformed. In heating for tempering, it is best to raise slowly the temperature of the tools and furnace to avoid too rapid release of stresses during this heating operation.

Hardness of high speed steel at elevated temperatures is sometimes used as an indication of cutting efficiency. Determinations of the hardness of Vasco Supreme by the Mutual indentation method have been made at 1000°, 1100° and 1200° F. These hot hardness values are listed comparatively with other types of high speed steel in Table II. Prior to testing, specimens made from this alloy were hardened in oil from a temperature of 2260° F and tempered at 1000° F to a hardness of 67 rockwell C.

TABLE I
HARDNESS AFTER TEMPERING

Tempering Temp. °F	Hardness Rockwell C
As Quenched	65.5
900	64.5
950	66.0
1000	67.0
1050	67.0
1100	66.0
1150	64.5

TABLE II
HARDNESS AT ELEVATED TEMPERATURES

	Brinell Hardness			
Testing Temp. °F.	Vasco Supreme	18-4-1	18-4-2 + 8% Co	8% Mo + 1½% W
1000	677	510	575	
1100	576	480	520	475
1200	462	337	400	308

In tests throughout the country for over one year, the cutting qualities of this alloy have been amply demonstrated to be especially applicable to those materials normally considered difficult to machine. Reports on machining cast alloy steels, hard cast iron, treated alloy steels such as SAE 4340, and high carbon-high chromium tool steel indicate marked savings in machining time, and increased life between grinds. When machining bessemer screw stock, cold rolled steel, SAE 1035, etc., tools made of this steel are capable of operating at speeds 15 to 100 per cent higher than with 18-4-1 or 6-6-2 type high speed steels. In one manufacturing plant Vasco Supreme tool bits at 67 rockwell C gave performance equal to cast alloys in machining 0.30 per cent carbon, 8 per cent chromium, 1 per cent molybdenum castings using a surface speed of 63 ft per min, a feed of 0.014-in. and a ⅜-in. depth of cut.

Facing 6-in. gate valve castings of semi-steel on a Barrett 3-way facer, tool bits of this cutting steel doubled the performance of a standard tungsten-cobalt high speed steel while using a depth of cut of ¼ to ½-in. and a speed varying from 69 to 35 ft per min. As further examples, the following records are cited:

(1) A 3-in. wide flat form tool made from Vasco Supreme and placed in service at 67 rockwell C was used to form a 1⅛-in. diameter ball end on a treated SAE 4340 part. Performance obtained with nitrided tools made from 18-4-1 high speed steel was 380 to 400 pieces per grind, while the stock removed to resharpen the tools ranged from 0.020 to 0.030-in., speed of operation was 83 surface ft per min; Vasco Supreme tools operated at a speed of 100 surface ft per min, the number of finished pieces per tool grind was from 906 to 1230, and the stock that had to be removed to resharpen tools was only 0.005 to 0.010-in.

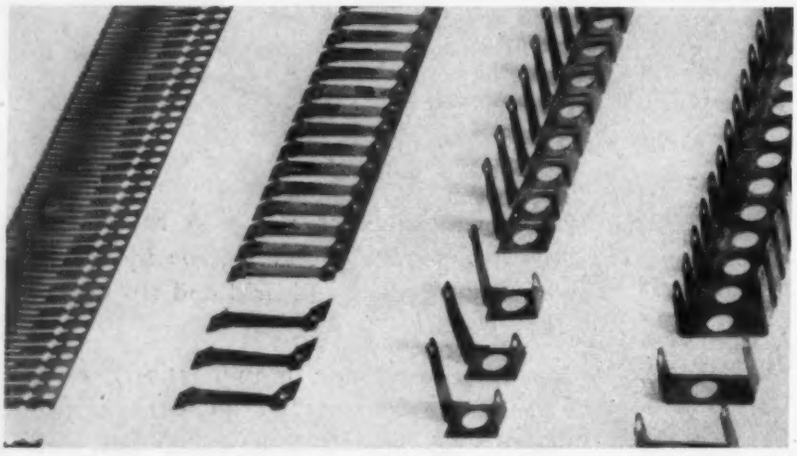
(2) A tool bit of this company's high speed cutting steel which was hardened to 68 rockwell C faced approximately ten times as many forgings of 240 brinell high carbon, high chromium tool steel as other high speed cutting steels. Speed at which these tools were operated was 205 to 53 surface ft per min, feed was 0.010-in., depth of cut was 0.005-in. The number of finished pieces obtained per tool grind for this set of conditions was 225-250 for this new steel developed by Vanadium-Alloys Steel Co.; 20 to 35 pieces for a 1.25 per cent carbon, molybdenum-tungsten steel containing 4 per cent vanadium; 12 to 24 pieces for a tungsten, 12 per cent cobalt steel; and 1 to 4 pieces for an 18-4-1 high speed steel.

These tests illustrative of many on single-point lathe and screw machine tools, flat and circular form tools, broaches, drills, and solid and inserted blade milling cutters demonstrate that the high hardness, improved wear resistance and improved hot hardness of this steel promise better tools capable of operating with higher efficiency and longer life between grinds.

—o—

Two new carbon dioxide fire extinguishers of 2½ and 5 lb capacity are announced by General Pacific Corp., 1800 South Hooper street, Los Angeles 21. Extinguishers fit same wall brackets as company's 2 and 4 lb units, which the new units replace.

Continuous Strip Method Cuts Cost of End Product



Individual small springs in the accompanying view are fabricated of beryllium copper in continuous lengths and with sections between parts partially sheared through, by a continuous-strip production method developed by Instrument Specialties Co. Inc., Little Falls, N. J. For production line items running in quantity, many parts are made with tolerances held accurately enough to eliminate completely hand adjustment and truing up after assembly.

Attachment between parts is sufficiently strong to keep lengths intact during inspection, plating, handling and shipping. Individual pieces, however, snap off easily when ready for assembly. Lengths are inserted in dispenser at assembly benches, allowing the operator to break off individual pieces as needed and stopping time-wasting untangling. Examples illustrated are for refrigerator control, automobile heater and electric clock motor. Savings in labor cost are said to have more than covered cost of parts

Where can you use a steel with these special qualities?

- ***Extreme hardenability throughout cross-section***
- ***Maximum hardness of 65/66- Rockwell C when quenched in oil***
- ***High tensile strength***
- ***High fatigue strength***
- ***Excellent machinability because of fully spheroidized structure***
- ***Withstands working pressure of 200,000 lbs/square inch***

THESE are the remarkable properties of 52100 high carbon-chrome steel—made by The Steel and Tube Division of the Timken Roller Bearing Company, world's largest producers and *only* source of 52100 Steel in three finished forms—bars, tubes, and wire.

Developed primarily for the anti-friction bearing industry, Timken 52100 steel offers outstanding advantages for any machined part where great strength and exceptional wear resistance are vital. And the label "Timken" means high, uniform quality—for we control production step-by-step from melting to final inspection of the finished bars or tubing.

Timken 52100 steel forging and machining bars are produced in a wide range of sizes. 52100 seamless steel tubing is also available in a wide range of sizes, grades and finishes. And for your emergency orders, a mill stock of 52100 tubing in 99 sizes, ranging from 1" to 10 ½" O.D., is available for immediate shipment.

If you need a steel with these special qualities, now is the time to contact The Steel and Tube Division, The Timken Roller Bearing Co., Canton 6, Ohio.

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Latest Lubrication Developments

.....revealed at ASLE Spring meeting

PROGRESS in the development of new lubricants and testing methods was brought out in the many papers presented before the Spring sessions of the American Society of Lubrication Engineers at the William Penn hotel in Pittsburgh.

At the meeting, Dr. Helen Sellei and Dr. Eugene Lieber of Nox-Rust Corp., Chicago, reviewed nature and chemistry of additives necessary to design engine preservative oils to meet exacting specifications. According to their paper, there is considerable interest in engine preservative oils of the permanent type which will not only incorporate the usual lubrication oil properties, but be a permanent rust preventive as well. At present, they revealed, the Air Forces are interested in developing an additive that will inhibit corrosion and, when mixed with aircraft engine oil, will be satisfactory for the lubrication of engines for the normal engine life that is attained with the use of aircraft engine oils.

Contact Conductivity Traces Obtained

D. W. Reed, F. Morgan and M. Musket of Gulf Research & Development Co., Pittsburgh, pointed out in their paper that stick-slip and contact conductivity traces have been obtained for dry and lubricated surfaces using all possible combinations of eleven metal sliders and eleven metal plates. The coefficient of static and kinetic friction may be determined from measurements on the slider traces of both. Tables and graphs giving the measured friction values for the various surfaces dry and when lubricated with mineral oil, with mineral oil containing 5 per cent oleic acid and with a silicone were shown, along with a number of stick-slip traces to illustrate the type of traces obtained for various surfaces and lubricants.

Management, faced with steadily rising costs of materials, equipment and labor, found that lubrication engineering influences all of these factors. So stated C. L. Pope of Eastman Kodak Co., Rochester, N. Y., who explained that consideration of the subject would indicate to management a need to control this phase of plant operation.

In most cases a capital investment is not required in order to put the savings in purchasing, storing and dispensing into effect. Analysis of machine failures from a knowledge of lubricants speedily corrects mechanical conditions where lubricants cannot alleviate the condition.

A presentation by Dr. T. C. Poulter, Armour Research Foundation, Chicago, dealt with effects of pressure upon physical properties of oils, and some of the uses of this data in the study of lubricating oils. A study of the data accumulated in the application of the extreme pressure technique to the investigation of fundamental and engineering problems uncovered certain correlations which give additional significance to these techniques as a tool in the study of lubricating problems, Dr. Poulter stated.

Lubrication Essential to Gearing

Just as gears are an absolute essential in modern industry, lubrication is an absolute essential to gearing, and without lubricants, industry could not exist, stated F. Richards, manager of engineering gearing division of Westinghouse Electric Corp., Pittsburgh.

With an abundance of good lubricants today, industry is faced with the problem of selecting the right lubricant for the application at hand in order to obtain the utmost in efficiency and at the lowest possible maintenance cost. In gearing, the maintenance of full film lubrication between gear teeth is a fundamental requirement for long life and satisfactory gear service.

Industrial gear drives of the enclosed type employing straight spur, single or double helical, straight or spiral bevel gears, may in general be satisfactorily lubricated by straight mineral oil of suitable viscosity. This will be benefited by the use of an oil having special additives such as a mild noncorrosive extreme pressure lubricant of the sulphurized or lead naphthenate type, particularly for the running-in period. Mild E. P. lubricants have been found to minimize if not completely prevent incipient or corrective pitting.

Worm gear drives, in general, should be lubricated by a compounded oil of from 3 to 10 per cent acidless or similar animal fats. Hypoid gears should always be lubricated by an E. P. lubricant. It is generally advisable to "play safe" and follow the gear manufacturer's lubricant recommendations.

Studies on instrument lubricants undertaken during the war to aid in finding a suitable substitute for scarce oil of marine mammalian origin was the scope of the paper of Dr. S. Bloomenthal, Automatic Electric Co., Chicago. He described an automatic apparatus using the inclination principle, with which measurements on the Hardy coefficient of static friction for a variety of instrument oils were carried out. Development of a new carrier plus additive type of telephone dial lubricant, serving as an improved substitute for porpoise oil, also was covered.

Government specifications pertaining to aircraft instrument and accessory lubricants, and problems confronting aircraft instrument and accessory manufacturers were covered by E. H. Erck, Bendix Aviation Corp., Teterboro, N. J. He described test methods employed for determining physical properties, discussed application recommendations for spreading and nonspreading oils and reviewed proposed new methods and apparatus for determination of physical properties.

Number of Bearings Increased

Trend toward higher speeds for certain types of apparatus and the decrease in weight of moving parts which usually accompanies such a change has resulted in the application of an increasingly large number of bearings which operate at relatively high speeds and comparatively light loads. Many of these applications use sleeve type bearings which are supplied with force feed lubrication. These facts were brought out by John Boyd of Westinghouse Research Laboratories, East Pittsburgh, Pa. and B. P. Robertson, formerly with the laboratories.

In order to obtain data which may be used in designing these bearings, oil flows, friction losses and running temperatures of certain common types of sleeve bearings were investigated, and observed values compared with those determined by calculation.

According to Frank C. Linn, General Electric Co., Schenectady, N. Y., radical changes were made in the oils used in turbine systems in the last few years. Most of the oils used today are inhibited to bring about definite improvements in turbine operation. With the change in lubricants, equipment needed for proper filtering and caring for the oil has changed.

H. Blok, Delft Laboratory, Royal Dutch Shell, Holland, stated that rotating oil

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rings compare favorably to other devices of pressureless supply of oil to bearings, yet when maximum cooling of the bearing by means of the oil is required, oil rings may often prove deficient if they are designed along conventional lines.

Increasing use of aluminum alloy bearings has verified the fact that such bearings possess high load carrying capacity and fatigue resistance, conformability and embeddability adequate for severe service and excellent resistance to attack by lubricating oils. According to H. Y. Hunsicker, aluminum research laboratories of Aluminum Co. of America, Cleveland, alloys in commercial use are basically aluminum with an addition of tin to improve the antifrictional and antiseizure characteristics and small amounts of metals to increase the mechanical strength required in service.

Properly designed and manufactured aluminum bearings should provide a service life of several thousand hours in engine operation at unit loads up to 4000 psi, he revealed. In general, best results are obtained when bearings of generous wall thickness can be used. Steel backed aluminum bearings are a recent development which holds considerable promise for thin wall bearing and bushing applications.

Also presented was a paper entitled "Latest Trends in Machine Tool Lubrication," by James Keen of Gisholt Machine Co., Madison, Wis.

MINIATURES IN MOTORDOM

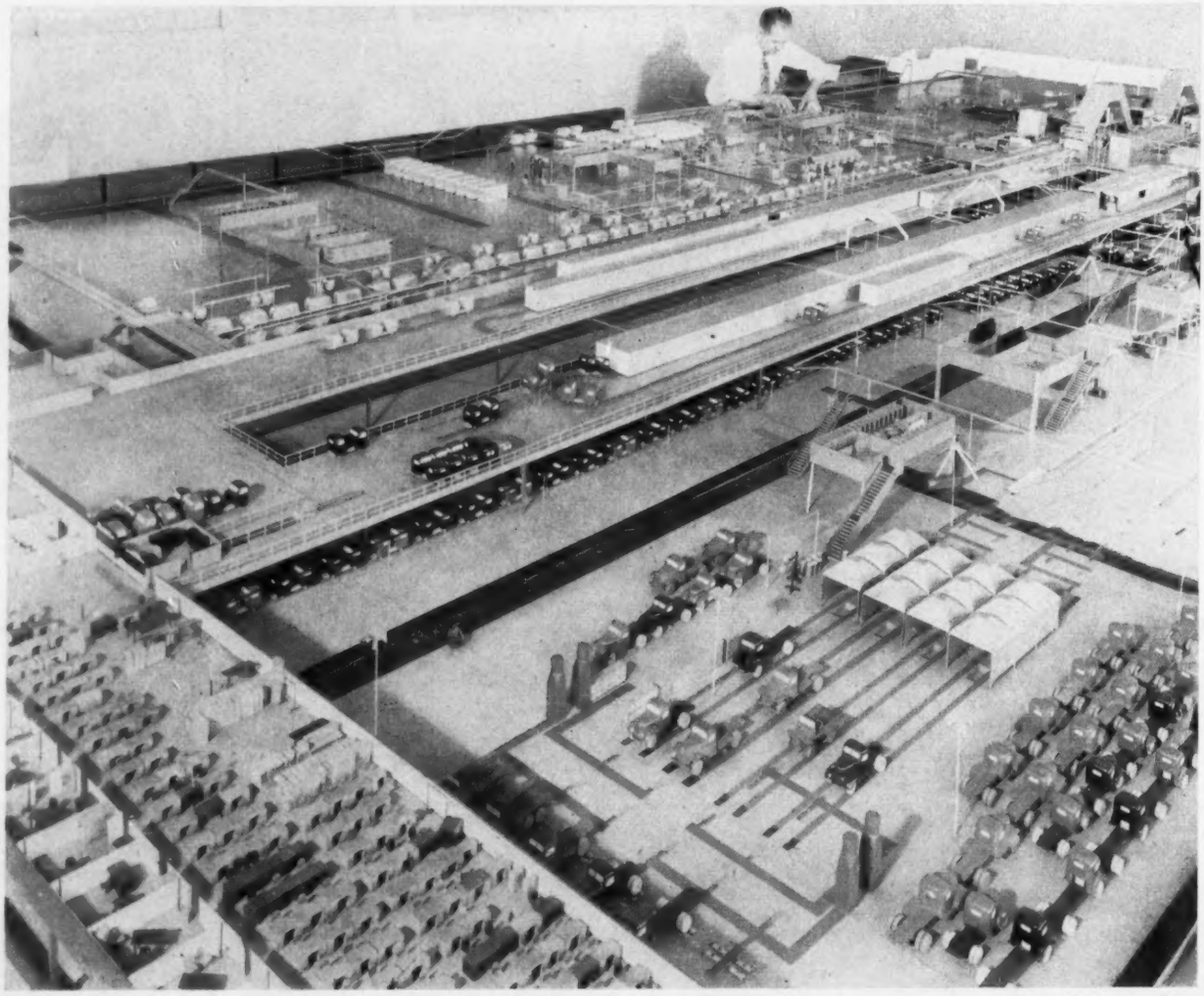
Facilitate Plant Planning

ANOTHER striking example of a scale model automotive plant layout is this replica of the interior of the Dodge Truck Division of Chrysler Corp., Detroit. The plant produces 175 different basic types of trucks with seven different engines and many choices of axles, frames, tires, wheelbases and bodies, making about 8000 possible combinations.

Erected on tables covering an area of 22 x 28 ft, the layout differs from some others in that the building structure itself is not reproduced, only interior floor areas, offices, equipment, conveyors, etc., as shown in the illustration.

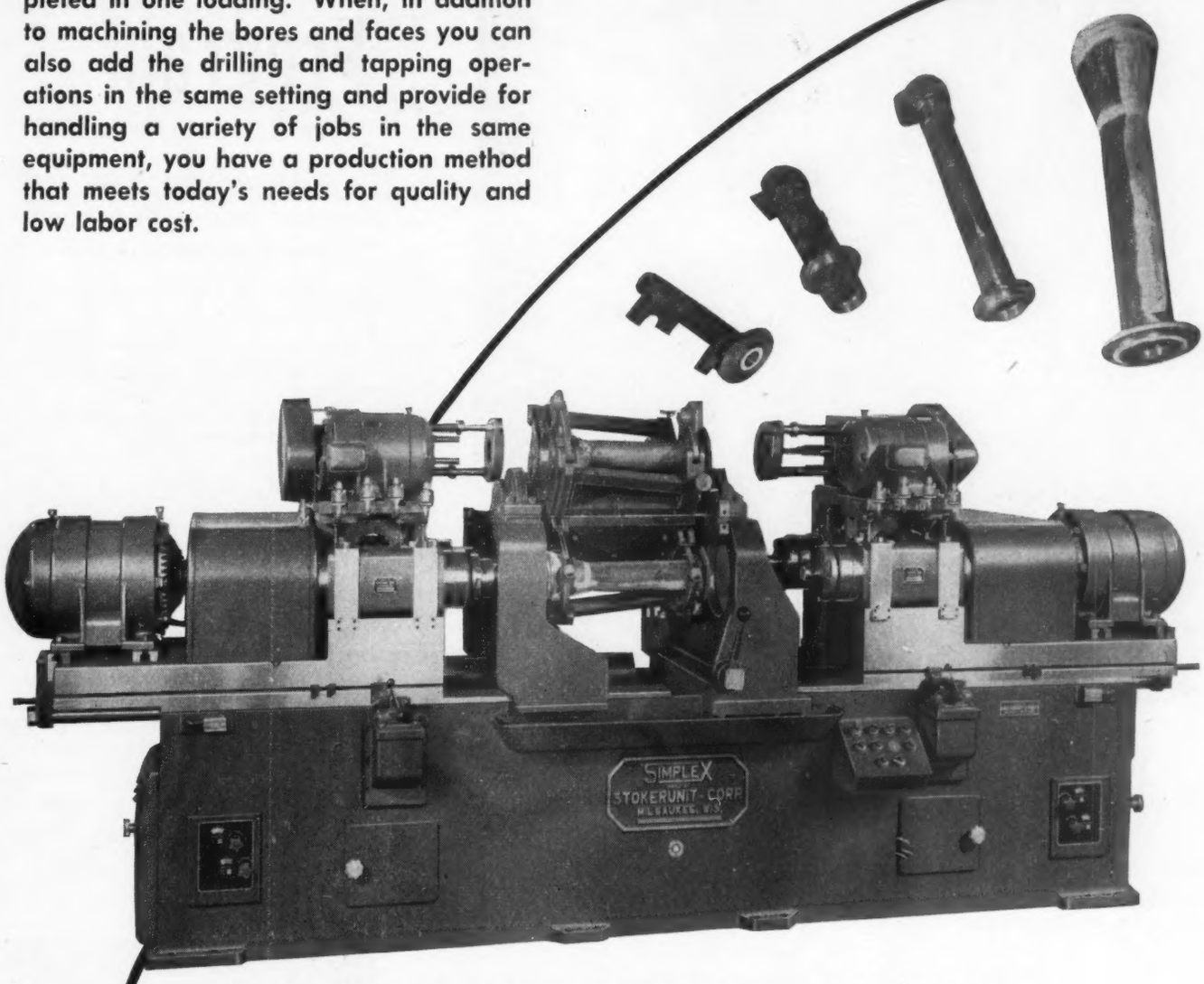
The model, built to a scale of ¼-in. to the foot, or 1/48th actual size, was started during the war when production of the plant was principally military trucks. It was found so helpful in determining space utilization, production shortcuts, flow of materials and installation of equipment that it was continued through postwar reconversion and is still in process of continuous refinement.

In all, there are 16,000 miniature models spotted on the layout, with 9000 more to be included shortly. Over 24,000 manhours have been expended in building the models, which, together with cost of materials, bring investment in the project to over $50,000. Most of the models — truck bodies, cabs, machine tools, storage bins, etc. are rough sawed out of soft pine and finished to scale by hand before being painted. Four men work on the installation; one has been on the job for 5 years, one for 3 years and two for 2 years each. Fred Lamphear is in charge, working under Harold Hocker, plant engineer.



SIMPLEX

Machining tubular parts where the bores must be concentric, the faces parallel, is a difficult job unless the work can be completed in one loading. When, in addition to machining the bores and faces you can also add the drilling and tapping operations in the same setting and provide for handling a variety of jobs in the same equipment, you have a production method that meets today's needs for quality and low labor cost.



The machine pictured is a SIMPLEX 4U 2-way Precision Boring Machine with four #4 spindles mounting combination boring and facing heads and also carrying unit type drilling heads with bushing plates for the drilling operation. By changing the fixtures, drills and boring tools, the various pieces illustrated can be handled with the same machine, thus this machine becomes in effect a production department in itself.

Precision Boring Machines

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SIMPLEX Machine Tools Division

4532 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

"Safety Captain" Program

. . . cuts steel plant's lost-time accident average by one-half, since its adoption in 1937

By ROBERT M. MASSENBURG
Supervisor of Safety
National Works, National Tube Co.
McKeesport, Pa.

IF YOU were the general superintendent of a large steel plant employing an average of 7000 employees daily exposed to the potential injury hazards that are common to operations involving blast furnaces, open hearths, rolling mills, finishing mills; and if you maintained an exceptionally low accident frequency over a period of many years, it would be only natural for you to scrutinize your safety practices to determine which factor or factors you considered most instrumental in maintaining this type of safety performance.

Majority of operating executives and safety directors would say that a good safety record is the result of a combination of many safety activities, a line of reasoning with which we are in accord. However, there will be certain activities which stand out for special consideration and comment. They become your "ace in the hole", because their performance and the results therefrom are manifested in many ways. One such activity in our plant is the "safety captain" program.

While the safety captain idea is not necessarily original with us, National Tube was among the first to use it. The program began in 1937, as a novel and new line of approach in attacking safety problems. The idea clicked. It appealed to the employees, and management foresaw its possibilities.

Basically, the idea was excellent. The problem consisted of getting everybody actively interested and engaged in the plant's safety program. Since 1937 the plant's lost-time accident average frequency was about one-half of that previous to 1937. It is not claimed this entire improvement was the result of the safety captain program, but we do feel that it was an outstanding factor in the inprovement in safety performance.

Those familiar with the labor situation during the hectic days of World War II need no reminder that labor was scarce. We recruited our help as did many other plants from every walk of life. Men, women and even 16-year-old boys were employed. Into a strange environment came this army of raw recruits, eager, but untrained to complete tasks they had never heard of, and had never even seen before. It was necessary to train, to orient and to keep them safe from accidents and injuries.

Our safety problem was clearly presented to the safety captains, who could readily understand the situation. Their co-operation and willingness to help safeguard these newcomers were far beyond our expectations.

Just what is a safety captain? What does he do? How does he do it? He is an employee selected by the supervisor to assist him in correcting and eliminating unsafe practices and unsafe conditions

Fig. 1 (above)—"Spare your feet from injury—wear your safety foot guards." A friendly warning from a safety captain

Fig. 2 (right)—"No goggles, no grinding! And tuck that rag in your pocket"

Advertisement APRIL, 1947

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

Do Not Underestimate the Importance of Spring Materials!

Engineers have long recognized the vital and constantly increasing importance of the spring elements which are the heart of literally millions of electrical and mechanical devices and controls. As more and more operating, measuring and safety devices are turned over to automatic control, more attention must be given to the use of the correct metals from which these essential spring parts are made.

Dependability is a Prime Consideration

First of all we must make sure that the metal will not fail to do its job in service; therefore, we must find out whether it is dependable. Does it have the necessary spring properties which will be retained under repeated flexing? Has it high fatigue resistance? Does it withstand mechanical abrasion? Does it resist corrosion from moist air and destructive fumes? Is it subject to season cracking? Does it withstand the effects of frequent arcing? Has it good electrical conductivity?

Since most spring elements must be very sensitive, they are made from relatively thin gauge metal; consequently, great strength and stiffness are essential. Yet, the metal must often undergo severe mechanical operations, such as stamping, bending, forming and drawing. It must also be amenable to soldering, welding and electroplating for certain applications.

Service Tests Most Helpful in Determining Life Expectancy

The standard physical tests, such as tensile, yield and percent elongation determinations and microscopic examinations, are not sensitive enough to choose a long-lasting spring metal as compared to one that gives a shorter life, although laboratory endurance tests are helpful. Manufacturers generally resort to life testing devices which subject the spring part to the same service as it receives in actual use. A counting device records the number of times the part performs before it breaks down or loses its efficiency. This method is the best and most accurate for selecting the proper material.

The quality or liveliness of the spring material depends largely upon the alloy composition, the correct melting practice, and the proper processing methods used at the mill.

Good design is of utmost importance. This includes the selection of the proper alloy, bearing in mind properties such as a high endurance limit, the correct metal thickness, and the relation of the bends and the direction of rolling in the metal strip. Other factors which affect spring life are the presence or absence of burrs and sharp edges, the operating temperature range, and the intensity of the corrosive condition.

Since variety in style, size and shape are rampant, space does not permit going into the matter of spring design, which is a complicated subject in itself and outside of our field. As manufacturers of copper-base spring metals, we will point out a few facts which come to our attention through laboratory observations. In strip metal, spring properties, including stiffness, hardness, and strength, are imparted by cold rolling after the final anneal. The range of physical properties depends upon the composition of the alloy, the amount of reduction by cold rolling, and its grain size developed during the last annealing treatment before final rolling.

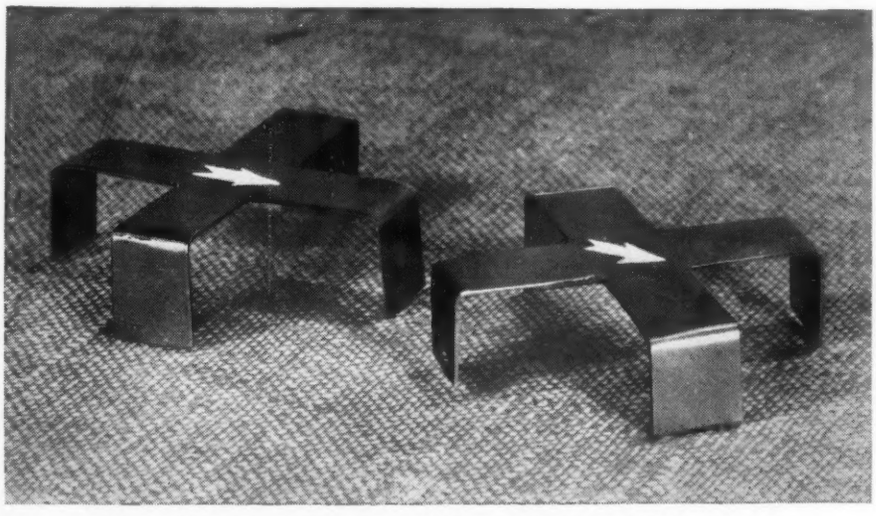
Correct Temper and Surface are Important Factors

Spring metal is generally rolled 8 B & S numbers hard but may range from 3 to 10 B & S numbers hard. Cold rolling also affects the internal structure of the metal so the grains are elongated in the direction of rolling. It withstands a greater degree of bend and will possess more lasting spring properties when flexed across the grain than when flexed parallel to the grain. This directional property should be taken into account when setting up blanking tools, making sure that severe bends will not be made parallel to the direction of rolling, as the metal is much more liable to fracture if bent in this manner. If sharp bends are necessary parallel to the grain, a less hard material must be used, or the radius of the bend should be increased. Many manufacturers of complicated springs blank the parts at 45° to the direction of rolling as a helpful measure when bends must be made in two directions.

The quality of the surface affects the endurance of the spring. A smooth surface is superior to a rough one. Smoothness can be obtained by subjecting the finished parts to air blasting with fine, hard balls. This operation removes burrs and rough surfaces of bent portions and generally increases the endurance limit.

Since the efficiency of a spring depends upon the elastic properties of the metal, which in turn is related to its modulus of elasticity, copper-base alloy spring materials are more suitable than ferrous

(Continued on Second Page, Column Two)



Phosphor bronze samples bent parallel (left) and at 45 degrees (right) to the grain. Note absence of cracks in the latter.

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

GALVANIC CORROSION

Effect of Concentration of Metal Ions

In the previous issue of this column we showed that the tendency of a metal to release electrons and pass into solution in the form of metal ions (corrode) is measured by the potential of the metal against a solution of its ions. In addition, when two dissimilar metals are joined together with a conductor to form a galvanic cell, the resulting electromotive force (voltage) is the sum of the two single electrode potentials. The symbol E is used to designate the electrode potential of a metal when surrounded by a solution of its ions.

Equation for Calculating Effect of Ion Concentration

The potential of an electrode varies with the effective concentration of the ions surrounding it. A number of equations have been developed regarding this matter. The following is one of these equations reduced to its simplest form.

$$E = E^\circ + \frac{0.059}{n} \text{ Log } C$$

where these symbols represent:

- E = Single electrode potential at given effective concentration of its ions (activity).
- E° = Standard single electrode potential at unit activity (as found in standard tables).
- n = Valence of the metal ion.
- C = Effective concentration of the metal ions (activity).

For example, if a copper electrode is immersed in a solution of copper ions of unit activity (1 gram ions per thousand grams of solvent), the potential against a hydrogen electrode (standard assumed to have a potential of zero), E in the above equation becomes 0.3441 volts, which in this particular instance is E° (Standard electrode potential for copper).

Effect of Decrease in Concentration of Ions

If, however, the activity of the copper ions is 0.0001 (1/10,000 gram ions per thousand grams of solvent), E becomes 0.226 volts, which is arrived at as follows:

$$E = +0.3441 + \frac{0.059}{2} \text{ Log } 10^{-4}$$

$$E = +0.3441 + (0.0285 \times -4) = 0.226 \text{ volts}$$

It is evident from this calculation that a ten thousandfold decrease in the activity of the copper ions results in a substantial decrease in the single electrode potential (less positive).

The use of this equation makes it possible to calculate the potential of an electrode at a given activity of its ions, or to calculate the activity of the ions from the measured potential.

Effect on Potential of Galvanic Cell

It follows, therefore, that the potential of a zinc-copper galvanic cell consisting of the copper ions at a concentration of 1/10,000 activity and zinc ions of an activity of 1 becomes 0.9878 volts.

This is arrived at as follows:

$$E = E^{++}_{Zn,\ Zn} + E^{++}_{Cu,\ Cu}$$
$$= 0.7618 + 0.226 = 0.9878 \text{ volts.}$$

Do Not Underestimate the Importance of Spring Materials

(Continued from Page One, Col. 3)

springs for low and intermediate stress applications of large deflections.

The Use of Best Materials is Most Economical in the Long Run

The cost of metal for spring parts is relatively unimportant when one considers the vital role it plays and its relation to the cost of the machine or equipment which it controls. Only the best should be used if long and dependable life is desired. Before establishing definite specifications for alloy and temper, it is well to try out small sample lots. Where rigidity is essential, the metal can be made stiffer by ribbing or flanging. However, when replacing spring steel, a thicker section of the copper-base spring metal is required because steel is more rigid. Among the advantages of the former are much better corrosion resistance and high electrical conductivity properties.

Bridgeport Offers Wide Range of Spring Materials

A number of copper-base spring materials are used for various applications. Among them are Phosphor Bronze, grades A and C; Nickel Silver, 18% grade B; Duronze II spring metal; Aluminum Bronze 712, and some brasses. Applications cover a wide range — electrical snap switches, diaphragms, current collectors, spring contacts for radios and electrical and mechanical devices, fuse clips, metal bellows, lock nuts and washers; clutch and bearing plates; slides and parts that must withstand excessive corrosion.

Bridgeport's Technical Handbook Available

The composition, physical, mechanical and fabrication properties of most popular alloys and their applications are described in Bridgeport's Technical Handbook, which will be supplied on requests written on company stationery. Contact our nearest branch office for aid from our Technical Service Department.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Self-Flaring Tube Fitting is said to give advantages of both compression and flared fittings. Plain end tubing of various metals can be inserted and made up conventionally. Tube connection is self-extruded and flared to a 37-degree flare by wrench action producing a reusable leakproof joint. **No. 760**

Plating Rack Coating which is highly resistant to all plating and cleaning solutions is claimed to be applicable by hand dipping. Dries in 1 hour, serviceable in 24, it is said to flow freely and drain rapidly, without forming webs or stands to be trimmed. **No. 761**

Portable Hardness Testing Unit adaptable for testing rounds and flats up to one inch is announced. Anvil, diamond penetrator, magnifier and frame comprise unit. Screw action is employed with pressure applied in kilogram loads. Denotes hardness in both Rockwell B and C scales. **No. 762**

Steam and Water Mixer provides hot water up to 200 gallons per hour with temperature rise from 50° to 120° F., for industrial plant showers and washrooms as well as hot water process requirements. Compact unit can be used with steam pressures up to 125 psi, it is said. **No. 763**

New Coil Hand Truck, designed for easy handling of strip coils, wire coils, wheels, tires and similar articles, features an arm adjustable to height of hole in article to be lifted. Inserted in coil, it is claimed to lift and balance load over truck wheels. **No. 764**

New All-Crystalline Porcelains of exceptional mechanical and dielectric strength at temperatures up to 2000° F., are reported to be particularly suitable as insulators of aviation spark plugs, radar transformers and other uses involving sustaining loads at high temperatures. **No. 765**

Ultrasonic Materials Tester is said to indicate voids, cracks, laminations, poor bonds and other flaws in castings, forgings, finished machined parts, plastics and ceramics. Can also be used to indicate changes of viscosity, compressibility and density of liquids when they alter velocity of attenuation of ultrasonic transmission. **No. 766**

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL

Warehouse Service in Principal Cities

STRIP AND SHEET—For drawing, stamping, forming, spinning. Leaded alloys for machining, drilling, tapping. Silicon bronze, phosphor bronze for corrosion resistance. Alloys suitable for springs. Engravers' copper and brass.

WIRE—Cold Heading alloys for screws, bolts, nuts, nails, fastenings, electrical connectors, Phono-Electric trolley and contact wires.

ROD — Alloys for screw machine operation. Duronze III high strength, corrosion-resistant, good for machining and hot forging. Hot forging and cold heading alloys. Welding Rods. Copper-covered ground rod.

TUBING—For miscellaneous fabrication. For condensers and heat exchangers. For water, air, oil and hydraulic lines.

DUPLEX TUBING—for conditions too severe for a single metal or alloy.

PIPE—Brass and copper for plumbing.

FABRICATED GOODS — Plumbing brass goods. Radiator air valves. Aer-a-sol insecticide dispensers. Automobile tire valves.

TECHNICAL SERVICE—Staff of experienced, laboratory-trained men available to help customers with their metal problems.

WAREHOUSE SERVICE—Warehouse and jobbers stocks available for prompt delivery in principal cities.

TECHNICAL LITERATURE—Manuals and handbooks available for most products.

"Bridgeport" BRASS

BRIDGEPORT BRASS

BRIDGEPORT BRASS COMPANY, BRIDGEPORT 2, CONN. • ESTABLISHED 1865

which might result in an accident or injury within his work area. Now the average supervisor has his hands full with many problems; he appreciates any assistance he can get to help him properly to execute the responsibilities that are included in his job.

A safety captain is selected to act as a safety inspector for a group of approximately 30 to 40 employees. Who is better qualified to act in this capacity than one who works with the group, understands their problems, knows the jobs being done and what is and should be the safe way to do the jobs?

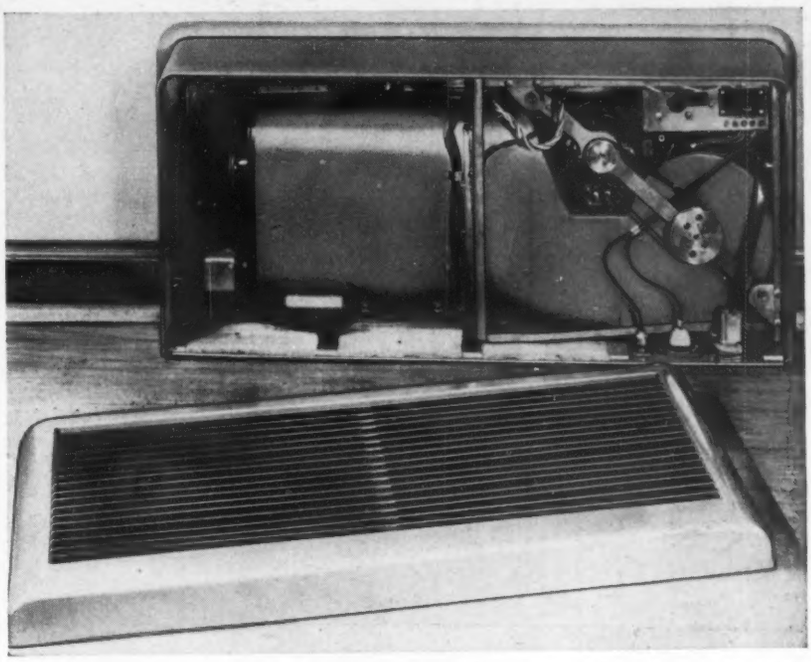
It has been our policy to appoint groups of safety captains to office every 3 months because we believe each employee so appointed becomes innoculated with some degree of safety consciousness. In a year, with the appointment of approximately 180 safety captains each quarter, we gain the moral support of 720 employees in the furtherance of our safety program. Frequently a safety captain will show outstanding ability, and his supervisor requests his retention in office for further service. We have had instances of this kind, where safety captains have been retained in office for periods of a year or longer.

Captain's Duties Outlined

At the initial appointement of each group of safety captains, a special letter is issued from the safety department in which an effort is made to stimulate interest, enlist support, enthusiasm and cooperation in the promotion of safety. We try to impress on each captain the importance of safety to himself and his fellow workers. We outline his duties as a safety captain, give him permission to take 15 to 30 min each turn to check on practices and conditions within his department or to devote the time to contacting employees in his group on safety matters.

He is instructed to take steps immediately to correct unsafe practices or conditions he observes by talking to the employees concerned and, where further action is required, report the matter either verbally or in writing to his supervisor. If the latter course is followed, he will make a special report in triplicate, handing his supervisor one copy, forwarding a copy to the safety department for its attention and follow through to see that reported items are properly corrected. He retains one copy for his own information.

In many instances, the induction of a new group of safety captains is handled by the supervisors calling a special meeting of those selected to serve in that capacity. At that time, the supervisor further outlines the duties of a safety captain and discusses the safety problems within the department and solicits their co-operation and support. In other cases, the supervisors personally contact each employee and advised him of his appointment and makes a bid for the employee's assistance. In either case, the employee selected is presented with a special safety captain button, which he is requested to wear in a conspicuous place on his person. As a further means of acquainting the employees in every department and group as to who their safety captain is during each three month period, a special poster is printed and posted in the respective department bearing the safety captain's name and clock number.



MIDGET HEATER: Built of stainless steel, this gas-burning South Wind furnace designed by Stewart-Warner Corp., Indianapolis, is the size of a suitcase and can be installed in 3 hours or less by one person. A product of the company's wartime development of aircraft heating equipment, the unit is 14 in. wide, 30 in. long and about 9½-in. thick. Weight without cabinet is 45 lb and with cabinet, 70 lb

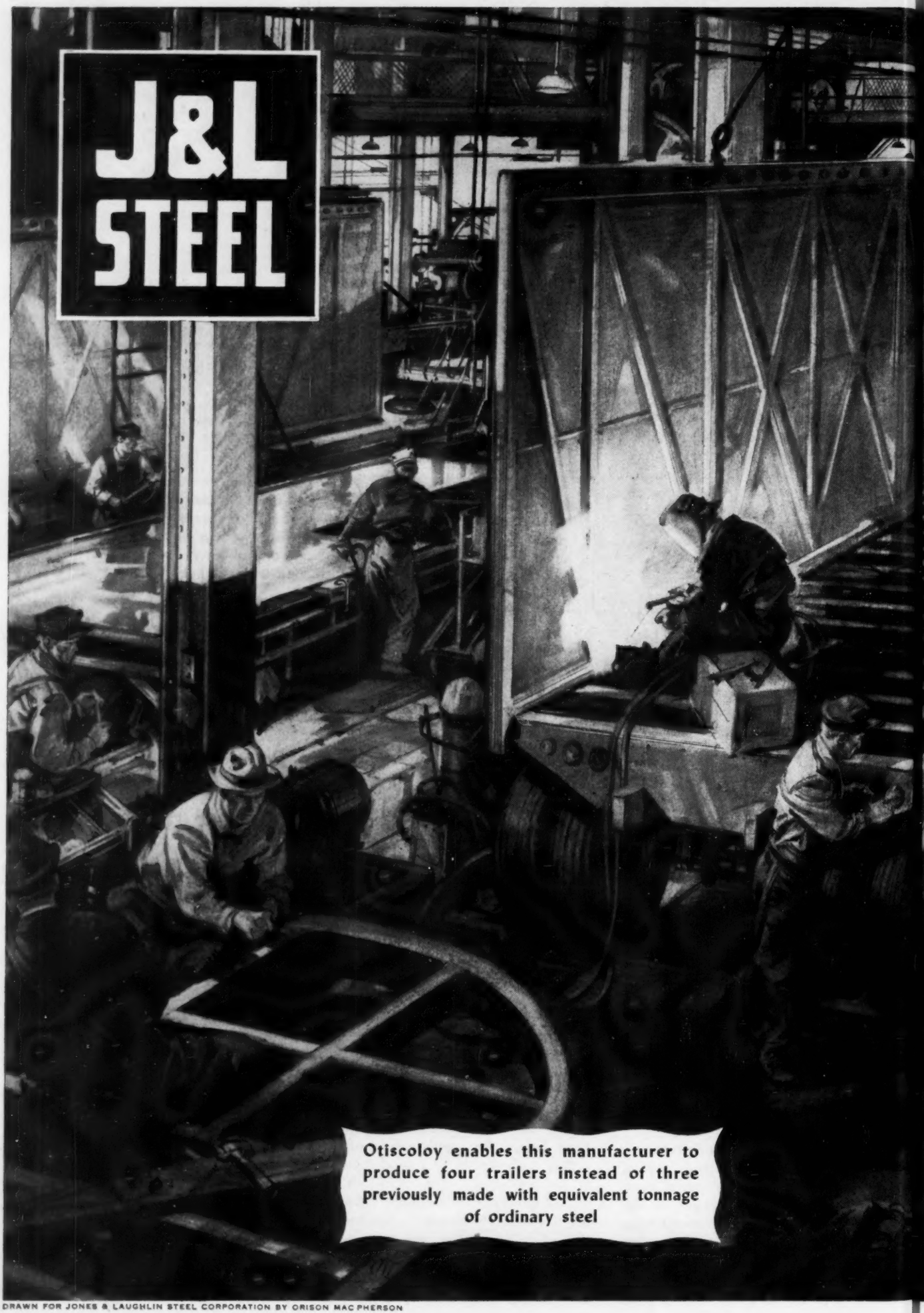
Management Supports Program

The employees must be made aware of the fact that management never ceases to support the safety program actively. This is accomplished through proper recognition of the safety captain. For instance, each month the safety department issues a letter and accident facts bulletin to all safety captains which contains some words of praise or encouragement, or it may stress certain safety factors for consideration. Often with these letters, we supply safety captain calling cards similar to a regular calling or business man's card, on which are printed safety slogans, including the wording, "your safety captain". We request the safety captains to use these cards, to pass them out to every employee in their group, as a sort of introduction, or get-together card.

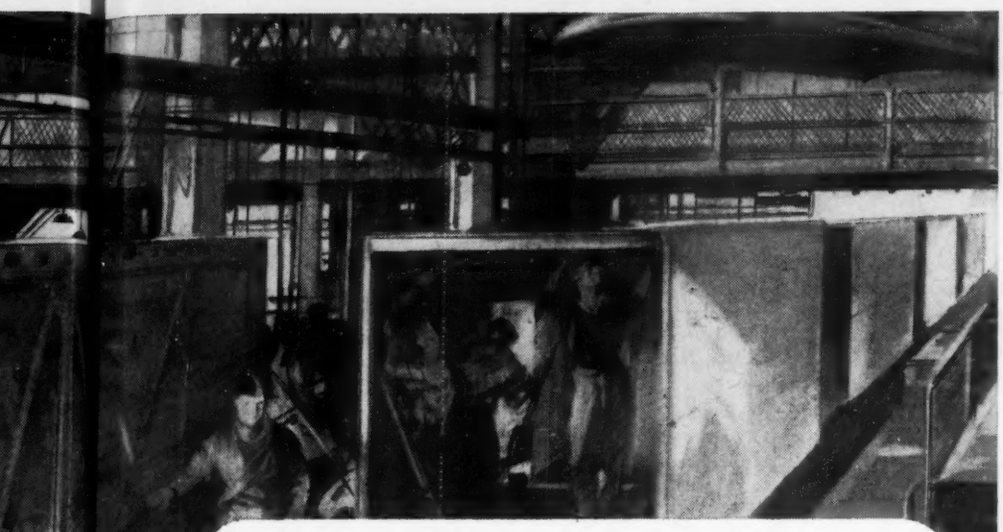
Department superintendents and supervisors make it a special point to have their safety captains attend all departmental safety meetings. Safety inspectors and even plant protection guards, have a list of safety captains in their areas and make it a part of their duty to contact them personally.

A special meeting of all safety captains is called quarterly, three meetings being held in one day to accommodate the three turns, The speaker for these meetings is the assistant general superintendent, or, whenever possible, the general superintendent, who discusses the safety situation in the plant and points out ways and means whereby the safety captains can render valuable assistance to improve the plant's safety performance. Meetings are concluded with the showing of appropriate motion pictures. Whenever possible, arrangements are made for selected groups of captains who have shown outstanding performance to attend conferences and exhibits which may be held in the district.

Every industry is faced with the challenge. The more individuals who can be recruited directly or indirectly in meeting this challenge, the greater chance industry has in reaching the irreducible minimum in accidents and injuries. To gain this objective we must enlist the support of those most concerned—the ultimate loser from accidents and injuries —the average worker.


J&L
STEEL
Otiscoloy enables this manufacturer to produce four trailers instead of three previously made with equivalent tonnage of ordinary steel

DRAWN FOR JONES & LAUGHLIN STEEL CORPORATION BY ORISON MAC PHERSON



FOR MORE PRODUCTION WITH LESS STEEL USE J&L OTISCOLOY

The extra strength of J&L Otiscoloy High-Tensile Steel makes possible the production of one-third more units per ton by reducing the amount of steel per unit 25%. This reduction in dead-weight has been used to advantage in designing transportation equipment, machinery and many other products. Some manufacturers are now making four truck trailers from 12 tons of Otiscoloy where formerly they could make only three from 12 tons of ordinary steel.

J&L Otiscoloy has other advantages. It resists abrasion and atmospheric corrosion. It can be welded and fabricated readily. These extra qualities afford equivalent service life and lower maintenance costs.

Otiscoloy High-Tensile Steel is produced in sheets, plates, bars, angles, Junior Beams, Channels and Tees. A booklet giving detailed information on the physical properties of these products is available. It may suggest how you can reduce your production costs, make a third more products with an equivalent tonnage of steel—and make them better. Write one of the sales offices listed below for copy.

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HI-TENSILE STEEL

Truck pay loads are increasing due to high-tensile steels, such as J&L Otiscoloy, which permit lighter design without sacrificing strength. Not only can a trucker haul more pay load, he also can keep under most state highway weight restrictions.

Railroads use Otiscoloy plates and Junior Beams in both freight and passenger cars. Its yield strength of 50,000 p.s.i. makes possible greater pay loads. Its resistance to abrasion and corrosion keeps cars out of repair shops and on the road longer.

Cargo holds of lake boats and river barges wear out quickly from abrasion of unloaders and corrosion of wet iron ore, coal and gravel. Otiscoloy is replacing ordinary structural steels for this service.

150-ft. smoke stack, 10 feet diameter at base, and 6 feet at top was made of J&L Otiscoloy. Superior strength of this high-tensile steel and its protection against atmospheric corrosion were factors in specifying Otiscoloy Steel for this stack of welded steel construction.

Furnace stoker worms of Otiscoloy have greater resistance to abrasion and corrosion, reduce maintenance costs.

Tough steel sides and tops of new motor coaches made of J&L High-Tensile Otiscoloy Steel provide greater strength to carry more passengers without adding dead-weight. Frames are also constructed of Otiscoloy sheets and plates formed into light, strong structural members and welded in place.

Deep-freeze & air conditioning units are readily formed of Otiscoloy sheets to resist corrosive action of moist air.

Shoe making equipment built of Otiscoloy is stronger, yet excellent weldability makes for easy fabrication.

25% reduction in weight is possible in dump trucks through use of Otiscoloy angles, channels and sheets for frames and body. Wear and tear from abrasion and corrosion are reduced. For these reasons Otiscoloy has also been used to advantage in mine cars, bins, chutes, cranes, power shovels, mowers, tanks, radiator brackets, advertising sign frames.

For assistance in selection and use of steels and steel products, contact nearest J&L District Sales Office listed at left or write: Publicity Manager, Jones & Laughlin Steel Corporation, Pittsburgh 30, Pa. From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in Otiscoloy and Jalloy (high-tensile steels). Principal products: **Hot Rolled & Cold Finished Bars and Shapes; Structurals & Plates; Hot & Cold Rolled Strip & Sheets; Tubular, Wire & Tin Mill Products; Precisionbilt Wire Rope; Steel Barrels & Containers.**

Better quality coke is produced from coal farther away from outcrop. Yield of coke from Utah coals is 67 per cent. Mixing iron ore faces at mine and bedding system at plant serve to maintain spread of magnetite content to about 4 per cent. Blast pressures from 16 to 18 psi are employed

COKE AND

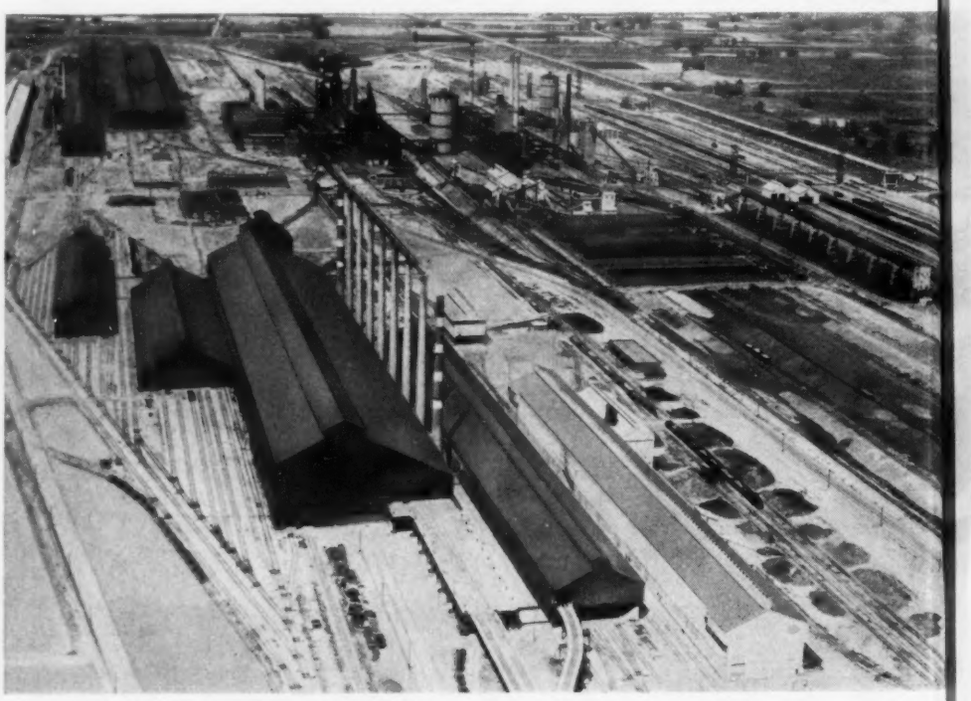
PRIOR to about 1910, Connellsville beehive coke was the standard to which American coke producers and blast furnace operators worked. Ovens were located near the mines and coke was produced from a single coal that previously proved to be satisfactory. With the advent of the by-product oven located at the steel plant the problem of coal supply became more complicated as well as diversified, and it was not long before the coke producer, in an effort to duplicate and improve upon Connellsville coke, resorted to blending two or more coals. In order to obtain suitable coals, the coke producers searched far and wide, and at times incurred considerable expense. But this proved to be the most economical means of assuring a suitable coke supply and substantially increasing the reserve of coal suitable for its production; hence, this method will be followed in the future wherever it is economically feasible, since by-product coke produced from blended coals has definitely shown itself to have a quality advantage for metallurgical purposes.

In Utah, operators coped with a problem of a different nature. Large quantities of coal are available but not the varieties found in the East. In fact, in Utah, it merely becomes a choice of one out of one. Practically all of the coal is high volatile and can be compared to eastern gas coals approximating 38 per cent volatile content. Bituminous coal reserves of Utah, according to the Bureau of Mines are estimated at 88 billion tons of easily mineable coal, the major part of which is considered as noncoking. This is estimated to be 6 to 7 per cent of the total United States bituminous reserves. There has been some talk of Utah also having another estimated 300 billion tons of coal more difficult to mine, though verification is lacking. However, since no other coal is available, except at a price reaching a prohibitive figure, the problem is challenging. This coal presents another problem in that it is generally high in oxygen and must be classified as a relatively young bituminous coal with marginal coking properties.

The particular coal basin in Utah, with which Geneva is concerned, was formed by the earth's internal pressure creating a bump or swell on the surface, with the elements in time eroding a part of the circumference and the entire center to a depth of several thousand feet and creating a great horseshoe-shaped plain, almost surrounded by a series of cliffs which contain the coal seams. These seams dip away from the center of the former swell. In the Geneva mine, located some 30 miles east of Price, Utah, and about 135 miles southeast of the Geneva plant, the dip approximates 12 per cent. A number of coal seams occur in the cliffs around this horseshoe, the most workable of which are from 6 to 14 ft thick on the side where the mine serving the Geneva plant is located. Directly across the horseshoe, some 50 miles away, the seams vary up to 40 ft thick. However, while the circumference of the horseshoe structure contains large reserves, the coal suitable for the production of metallurgical coke appears to be confined to a relatively small portion limited to a few miles on the eastern side of the horseshoe. The better grade of coking coal contains approximately 9 per cent oxygen. However, these analyses are subject to some fluctuations due to faults, distance from the outcrop and the water table.

One of the first observations made was that better quality coke was produced from coal relatively farther away from the outcrop and thus development has been in that direction. The dip in the coal seam is such that work proceeds in from the outcrop the height or thickness of the overburden is increased. Because of this, it is entirely possible that as mining down the slope continues to a greater depth, the coal will continue to improve in coking quality as has been indicated by operations and tests to date.

Some idea of the changing quality of the Utah coals may be obtained from the following comparative figures. Total coke yield of Utah coals approximates 67 per cent and according to tests the best coking coal in Utah has an oxygen content of 9 per cent and would give a furnace coke yield of 54.7 per cent when



Aerial view of Geneva Steel Co.'s plant, Geneva, Utah. Blast furnaces and by-product coke ovens are shown in center background

By C. L. WAGGONER
General Superintendent
Geneva Steel Co.
Geneva, Utah

Iron Practice In Utah

screened over a ¾ x ¾-in. screen. The next best coking coal in Utah has an oxygen content of 9.5 per cent with a furnace coke yield of 51.6 per cent. The poorest coking coal in Utah has an oxygen content of 10.5 per cent with a furnace coke yield of 50.6 per cent.

Test results were substantiated by practice. After one year's operation (1944) with 10.5 per cent oxygen coal, a furnace coke yield of 50.44 per cent was obtained as compared to the 50.6 per cent in the test. With 9.5 per cent oxygen coal, the actual one year's average yield (April to March, 1946) was 51.4 per cent compared to the test yield of 51.6 per cent. No actual production data on 9 per cent coal are available but since test and production data check on the other two coals there is every reason to believe the tests are reliable and that for 9 per cent oxygen coal a furnace coke yield approximating 54 per cent could be expected.

Test data have been presented here only for what they are worth in comparative studies, because they apparently indcate what might possibly be achieved if irregularities in a coal were controllable.

Aside from its influence on furnace coke yields, the coking properties of Utah coal have had a direct bearing also on the quality of the coke, and this has been, in turn, reflected in blast furnace operations. The poorer coking coal alone was used for the year 1944 and it required 2346 lb of coke (gross) to produce 1 net ton of iron. Deducting the screening at the blast furnace, 2023 lb of coke was used per ton of iron produced. Put another way, so as to include the coking operation, it required 4651 lb of coal to produce 1 net ton of iron.

From the foregoing gross and net coke figures per ton of iron, it is apparent that in addition to low blast furnace coke yields per ton of coal, the plant had to contend with a deficiency in coke quality. Hence, it follows, that an improvement in coal quality should contribute to an improvement in blast furnace coke yield as well as in blast furnace coke rate. With this in mind, a large number of tests were run and a correlation of the data was made. Several sections of the mine were segregated and the output of each section was further divided into coarse and fine coal. One conclusion, common to all sections was evident, namely: The coarse coal, that is, the lump portion of the run-of-mine production, almost without exception, produced better coke than the fine coal. Studies further indicated that without change in hammer mill practice, the coarse coal invariably resulted in a greater weight per cu ft of coal as charged in the oven which led to the surmise that an increase in the bulk density of the coal charge might in itself contribute to an improvement in the coke quality. This surmise was corroborated by results obtained when weather conditions were such that coal density varied. The quality of the coke was inferior when coal of low bulk density was charged.

Results of this experience are illuminating; however, they should only be considered as indicators of a trend and not as definite formulae of physical characteristics.

If coal weighing 45 lb per cu ft and having 38 per cent volatile content were charged into an oven, the voids resulting from coking would constitute 75.8 per cent of the theoretical solid using 1.85 as the gravity of the solid material in coke. A charge of the same bulk density, using coal having 30 per cent volatile content, would yield voids amounting to 72.8 per cent of the theoretical solid. The difference between 72.8 and 75.8 per cent or 3 per cent means an increase in voids of approximately 3.00 ÷ 72.8 or 4.11 per cent. The resulting coke would have a theoretical weight of 28 lb per cu ft. Actual tests showed 22.3 lb per cu ft of dry coke. When this actual weight is compared with a standard eastern coke weight of approximately 30 lb per cu ft, the relative strengths of the two cokes for supporting a furnace burden is indicated.

The problem at Geneva appeared to be one of reducing the amount of voids in the coal charge to improve cokability and at the same time to supply deficiency of coking medium which is essential for the coking process. This meant that the deficiency of wetting power caused by the greater volume of voids, or by the lack of fluidity, during distillation of higher oxygen coals, had to be supplied. For this purpose the most economical material seemed to be pitch. Reasons for the use of pitch are evident since the amount of wetting power deficiency is probably related to the increase in the percentage of voids, which was previously indicated as 4.11 per cent, as well as to the high oxygen content of the coal.

Examination of our coke disclosed uncoked coal indicating that an increase in coking temperatures was advisable. The fusion temperature of the coal ash was sufficiently high to allow for an increase in coking temperature without endangering the silica walls. The coke could not be improved sufficiently by changing only one of the factors discussed, so as it became possible, all of the changes contemplated were put into effect. Oven temperatures were increased approximately 100°F to an average of close to 2200°F. Coal pulverizing practice was changed until a weight of 49 lb per cu ft was obtained, which, by itself, would reduce the voids to approximately 73.8 per cent, thus making up two-thirds of the deficiency. Pitch was added to make up the balance and to produce the best quality of coke obtainable economically. The amount of pitch being added at present is 4 per cent.

Effects of these changes on the coke can be seen from the following: The weight of furnace coke has increased

OPERATING DATA ON NOS. 1 AND 3 BLAST FURNACES

	Avg tons iron per day		Coke per ton iron: Gross		Coke per ton iron: Net		Lb coal per ton iron		Fce coke yield, %
Fce No	1	3	1	3	1	3	1	3	
October	780	782	1775	1980	1707	1903	2885	3210	59.18
November	676	812	1793	1761	1727	1696	3040	2986	58.97
December	765	...	1643	....	1579	....	2812	....	58.43

by approximately 4.8 per cent on a dry basis; for 10 months (Jan. to Oct., '46) the furnace coke yield was 59.04 per cent, an increase of 17 per cent over the 1944 average; and the gross coke consumption per ton of iron was 1866 lb with the net coke consumption being 1790 lb per ton of iron. Much of the iron produced during this period was merchant grade of approximately 2.5 per cent silicon.

Blast furnace operation at Geneva was most interesting during this period. High coke consumption and the accompanying troubles incident to lost time and high and erratic blast pressure, have now settled down to more or less the usual range.

Limestone is obtained from company quarries. The quarry formation has several strata of limestone having varying contents of magnesia, silica and lime, but a fairly uniform stone is obtained by working several faces and blending at the quarry.

The fact that the silica content of the stone is higher than the stone used customarily in blast furnace practice is unimportant; as additional silica is sometimes needed in the burden.

Coke is screened over ¾-in. screen at the coke ovens and a ½-in. screen at the blast furnace with a maximum size at the furnace skip of approximatey 2 in.

Other blast furnace raw materials, such as manganiferous ore and phosphate rock, the analyses of which vary, are stocked and reclaimed, thus providing a sort of bedding operation.

One single grade of iron ore is available which varies widely in silica, lime, magnesia, alumina and hematite or magnetite content, but through a bedding system, these variations are leveled out satisfactorily. If more silica is needed it must be added as gravel or other siliceous material since no highly siliceous blending ore is readily available. Hence, the orc probem is similar to the coal problem, in that the deficiencies in its average composition are counteracted by additions.

After bedding, the ore is reclaimed and separated into two sizes for charging. This is done to obtain two sizes of ore in nearly equal amounts for charging so as to open the burden. However, no commitment to this practice has been made and it is still under observation and on trial.

The most interesting furnace problem, aside from consideration of coke quality, arises first from the fact that, as mentioned, the ore contains varying amounts of magnetite. Ore, as mined, varies from a low of approximately 20 per cent magnetite to a high of 78 per cent magnetite. Through mixing several ore faces at the mine, these wide fluctuations are evened out to the closer range of 25 to 45 per cent over the longer periods of time and this and our bedding system, keep the variations in magnetite content in each bedded pile of 12,000 tons, within limits of approximately 4 per cent. Secondly, the ore is hard, ranging from 0-in. to 2½ in. as delivered at Geneva and averaging about ⅝-in. at the present. The size of the ore is governed by the crusher setting at the ore mines near Cedar City in Southern Utah, about 265 miles from the Geneva Plant.

Since the specific gravity of hematite and magnetite are approximately the same and since Utah ore is not too different in analysis from Mesabi ores, any difference in the physical character of these ores, such as particle size, should be reflected in the blast furnace. Indication is that a greater percentage of voids prevails in the stock column of the blast furnace and this is due to hard and sized ore in particular, because the ore weighs 122 lb per cu ft while Eastern ore weighs 140 lb per cu ft. If to this lighter ore charge it is assumed that a coke is added capable of carrying the ore load without too much degradation, isn't it reasonable to expect a relatively open furnace?

Experiments were conducted with tuyere velocities from 350 to 730 fps and at present the blowing rate is at about the minimum given. At 1200° F., 375 fps is about 98 cfm of air per sq in. of tuyere area under standard conditions. This is somewhat lower than the usual eastern practice. We prefer to compare blowing in terms of foot pounds, and our present energy is approximately one-half of the normal eastern practice.

While this presentation is a factual progress report, rather than a technical paper on the reduction of ore, it seems permissible to inject the opinion that magnetite likes high blast heat and a hot bottom and that it is comparatively easy to have a furnace go cold if these prerequisites are neglected. Stress is laid on even operating pressures and although practice is still short of the ideal in this respect, operation is for reasonable periods of time at 16 to 18 psi of blast pressure. While this is general practice in the East, in Utah, however, it is a decided change from the 25 to 35 psi blast pressure heretofore considered normal for even a much smaller furnace.

Since the foregoing changes, including blast furnace practices, were instituted, sufficient coal has been available to operate the Geneva stacks at a rate approaching theoretical capacity for only a short time.

While our problems have not been solved completely and while no further changes may be necessary, yet the most recent results are encouraging as may be seen in the accompanying table.

As stated in the early part of this paper for the year 1944 it required 4,651 lb of coal at Geneva to produce 1 ton of iron. Comparing this with recent figures discloses an improvement approximating 35 per cent in fuel required per ton of iron produced. Comparing the same periods, average production of iron per day increased from 594 to 780 tons, or approximately 31 per cent. This is evidence of substantial progress toward the solution of the coking and blast furnace problems at the Geneva plant.

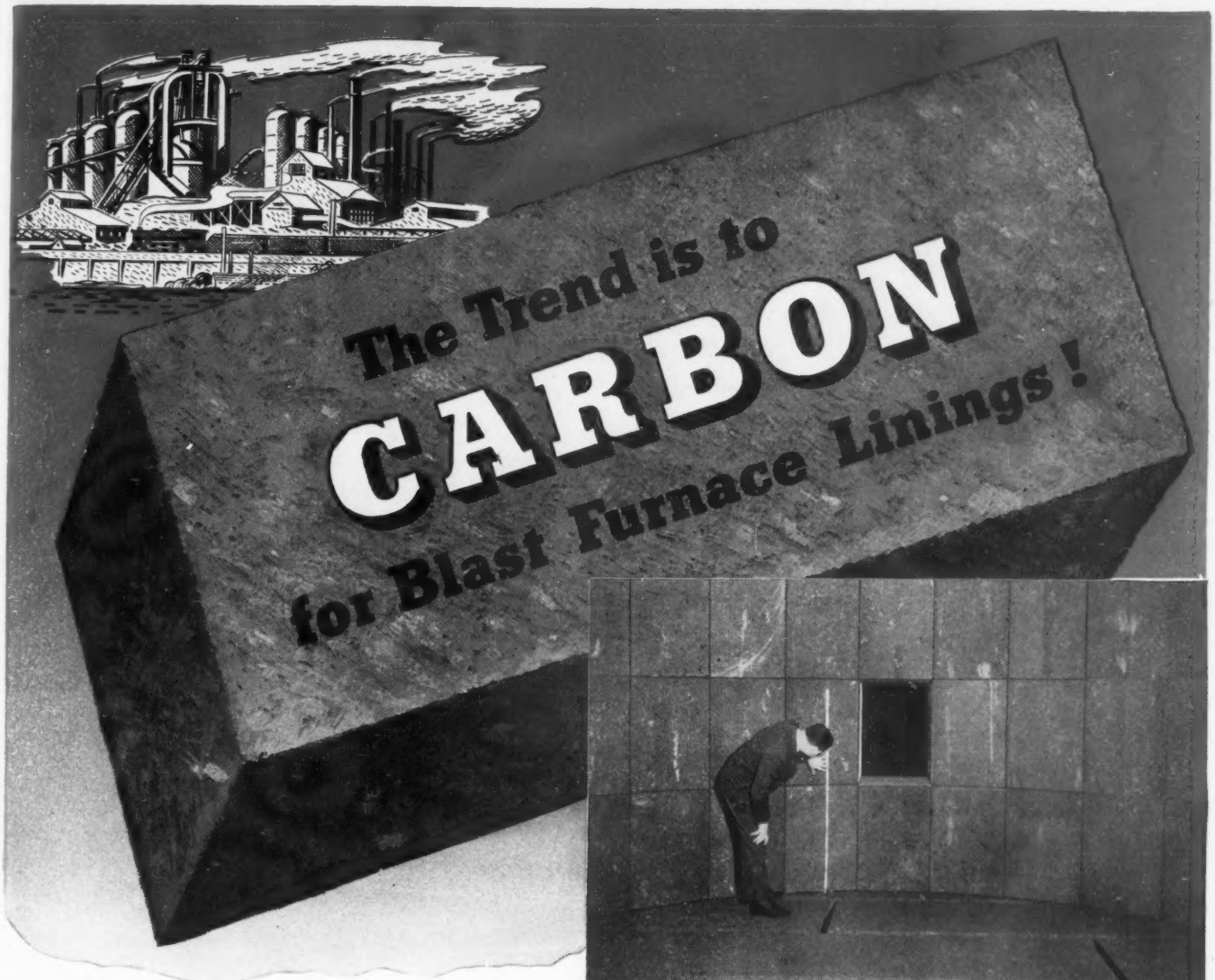
From a paper presented before the Blast Furnace and Coke Association of the Chicago district, Del Prado hotel, Chicago, Jan. 31, 1947.

Treatise Calculates Length of Bearing Life

A mathematical treatise on calculating effect of play or movement of antifriction bearings within their housings on the length of bearing life is available from the Office of Technical Services, Department of Commerce, Washington. The report, entitled "The Effect of Bearing Play on the Load Carrying Capacity of Antifriction Bearings," was prepared for the German aviation research institute and lists five items causing variation in the length of time that one of the balls or rollers may run before failing.

These five items are: Characteristics of the materials, smoothness of the running surfaces, accuracy of the rolling parts, distribution of the load on each individual rolling part, and the size of the loaded zone. Materials, smoothness and accuracy, according to the report, are generally taken care of by metallurgists and inspectors. The distribution of loads is a matter of elasticity of materials.

Calculating the probable fatigue life of bearings in an engine is, like many other applications of theoretical data in practice, a matter of statistical assumption. Tests of bearing life have shown as much variability as 40 to 1. The probability of failure after relatively short periods of service is not very great, but it must be considered.



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2 No Salamander!

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POWER INDUSTRIAL TRUCKS

Precision Castings

(*Continued from Page 94*)

fractory material is then broken away from the casting and cleaning operations are carried out.

Dies for producing the expendable pattern are usually made of metal, either a low fusing alloy, or steel. The machined steel dies have a greater initial cost and require machining experience of the highest sort. Soft metal dies may be made more easily and inexpensively by forming metal in segments around a master pattern. A hydraulic press of 10 to 20-ton capacity, Fig. 5, is used to form the die. The crude sections, formed by pouring the soft metal over the master pattern, are pressed together around the master pattern to form an accurate die. While these dies do not have the initial cost of steel dies, they will not maintain dimensional accuracy over as long a period. Dies should be prepared for easy direct extraction of the expendable pattern, and rapid closing for further injection.

Principles of injection molding apply to forming the expendable patterns. Machines have been developed to produce particular pieces, where long runs are to be made. In other instances, custom casting firms have engineered and developed their own machinery to produce expendable patterns covering a wide range of sizes. Standard equipment on the market includes small air pressure and air-hydraulic injectors. These proved satisfactory for small pieces.

In general, an injection machine should provide a means of maintaining the pattern material at controlled temperatures, of injecting this material under pressure into the mold, and of holding the mold closed during the injection cycle. Automatic opening and closing of the mold is a most desirable added feature. The pressure should be high enough to hold shrinkage of the pattern material to a minimum; it is understood that higher pressures permit using the material at relatively low temperature in a soft rather than fluid state. A machine meeting these general conditions is being introduced to the trade.

At the present time most patterns are formed individually and the next step is to assemble them on sprues and gates prior to forming the refractory mold.

Pattern making injectors should be developed to form patterns in gangs. This is difficult to arrange for some undercut pieces. The usual practice is to mount the patterns on expendable wax rods and stand these on a mound of wax. This may be in turn on a sprue base of rubber or metal. The shape will be tree-like, Fig. 2, or otherwise formed to facilitate the flow of the molten metal from the base to the work at the extremities of the branches.

The groups of patterns are now ready for investing. The refractory mold is prepared in accordance with directions of the manufacturer of the investment material used. Complete, even mixes are a prime requisite. Machinery is available to handle batches of all sizes. Amounts to be mixed will be limited by the number of patterns to be invested at any one time, and by the length of time the semifluid refractory material may be exposed to the air without setting.

Best practice requires either vacuuming the mixture to remove excess air, Fig. 3, or precoating the patterns to assure smooth finish on the castings. Choice of procedure, vacuuming or precoating, depends on the particular investment or refractory material used. Molds are formed by placing a metal cylinder, lined with sheet asbestos, on the sprue base so that the group of patterns is enclosed with a sufficient margin. Then the investment is poured on the patterns, vacuumed or vibrated, and allowed to air-set.

Commercial investments now on the market are generally divided into nonferrous and ferrous. Nonferrous investments originated with the dental industry, found extensive use in gold and silver jewelry casting work and are now being used widely for aluminum, magnesium, bronze and brass casting. Ferrous investments were developed particularly to meet war needs. There had been some prewar experience with steel alloy casting for medical purposes and also with platinum jewelry casting. Costs, in bulk, of both nonferrous and ferrous investments have been reduced substantially and efforts are being made to reduce them further.

"Burning-out" in a gas-fired or electric oven follows. This has several objectives. The first and most obvious is to remove the expendable pattern from the mold, thereby creating a cavity of exact size into which the molten metal may be cast. A low heat, about 200° F is required to melt most pattern materials; if this does not exceed the ignition point, there may be some recovery of the material. Its reuse as anything more than sprues or gates is not recommended as the material will have lost some of its quality and will not reproduce accurate patterns.

Secondly, refractory materials usually have to be put through a controlled heat cycle, to about 1300° F in one instance, to dry them out and develop their refractory quality to the utmost. Also, it is necessary to keep the molds under high heat to volatilize the pattern completely; otherwise, molten metal may become carbonized on the surface.

Lastly, the molds must be brought to a satisfactory temperature to receive the molten metal. This temperature will be such that the metal will not chill too rapidly, but will at the same time result in the work solidifying first and drawing on the button or riser. Too high temperatures result in porous casting due to continued "working" of the metal in the mold.

Casting Machines: Casting machines cover a wide range of types and sizes. No one machine is recommended to the exclusion of all others. Those which combine melting and casting have the advantage of reducing the time elapsing between terminating the melt and transferring the metal into the mold. For steel and other high temperature alloys induction melting is accepted practice. The molten metal may be cast, in some instances, directly from the melting crucible.

A newly introduced motor-driven machine has the melting crucible mounted on the casting arm, Fig. 8. When the melt is completed, the high frequency coil is dropped clear of the crucible and the casting machine is put into operation, the metal being transferred directly into the mold which is carried on the end of the casting arm.

One equipment manufacturer provides a multiple coil table and a casting machine which pours the metal from the melting crucible into the mold at the beginning of the cast. In other instances the metal is poured from the melting crucible into a distributing crucible at the center of rotation and so spread into two to four molds. In another type of machine, Fig. 1, the mold is held at the extreme end of the casting arm and the metal is poured into a distributing crucible next to it. The transfer takes place when the arm is rotated.

Also vacuum and air pressure machines have been built to order by some firms engaged in casting. A further variation is to make the refractory mold in disk form with patterns radiating from a central riser. The molten metal is then poured into the center while the mold is being rotated on its axis.

Breaking away the investment follows the cooling of the flask. An air hammer may be of assistance and abrasive cut-off equipment may be indicated to remove work from gates and sprues. Castings may then be pickled, sand blasted, Fig. 4, steam blasted or otherwise cleaned as particular conditions require. An important quality of an investment is the ease with which it can be broken away from the work. This has been given careful consideration in preparing investments for commercial use.

Capital and Labor Requirements: Capital requirements vary considerably. Exploratory work in nonferrous casting could be undertaken with the equipment used for jewelry production at a minimum of $2500. The addition of high frequency

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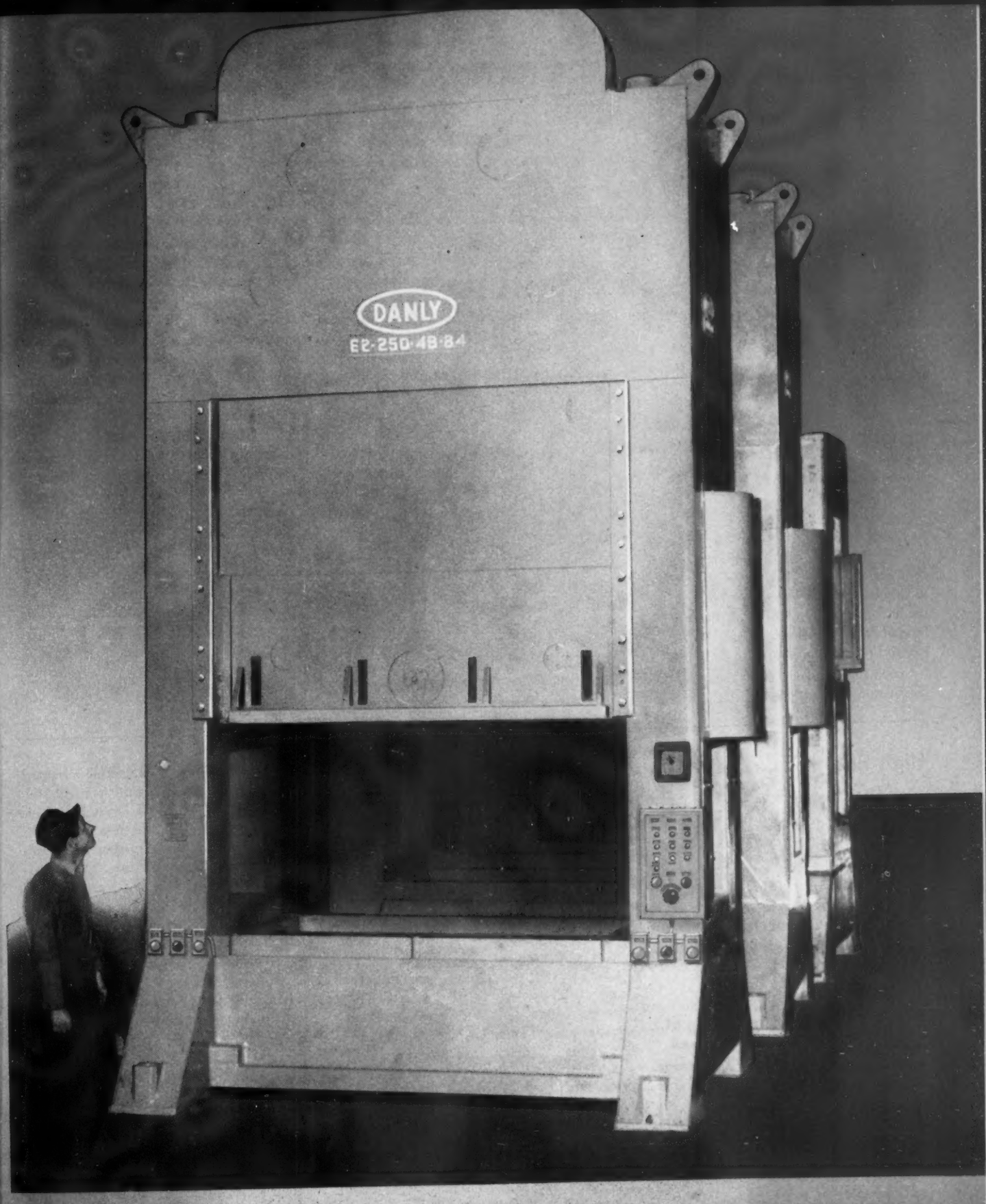

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equipment required for ferrous casting would double the initial outlay. For a small size producing shop or pilot installation, we hesitate to suggest a capital outlay of less than $10,000, and from $25,000 to $50,000 should be available to equip a plant for sustained production in substantial volume.

Many stages of the entire operation may be carried on by inexperienced workers, after a brief training period. Making expendable patterns is work which can be done by women. Their lighter touch and greater manual dexterity are of advantage. Equipment should be available, however, to handle heavy molds. Investment mixing and the embedding of patterns in the mold may be accomplished easily by following established practices. Melting and casting operations are critical and require close attention. Breaking open the flasks, cutting-off, and cleaning operations may be considered routine.

Die-making is most important. Soft metal die-making does not require great technical ability but care must be taken to form the molds so that the pattern may be extracted without distortion. Accepted techniques have been worked out and one method is discussed in detail in a booklet published by a manufacturer of casting equipment and supplies.

Space requirements depend entirely on production to be attained. Minimum pilot or experimental equipment may be operated in as little as 500 sq ft. Volume production, however, requires segregation of the several stages of the process. Separate rooms are preferable for different phases of operation to maintain uniform conditions. Pattern making, in particular, should be apart from investing and should be in air-conditioned space with good lighting a necessity.

Investing may result in some dry powder being released into the atmosphere, with ventilation to be considered. Burning out and casting operations should also be kept separate from other stages. Burnout ovens and melting furnaces should be immediately adjacent to casting machines. In mass production the casting room should be treated as a specialized foundry. Ventilation, fire protection, and other foundry practices should be observed. Breaking out molds, cleaning castings and sand blasting complete the casting production and should be in additional compartments to avoid interference with earlier and more critical stages of the work.

Expendable Supplies: Supplies expended in the process include pattern-making material and the refractory material. For pattern-making, wax has been the usual medium. Carnauba, beeswax, burgundy pitch and amorphous wax are included in most privately controlled formulas. Plastics of the polystyrene group have also been used successfully but production of such patterns has been an injection molding operation. A number of commercial blends of waxes are offered currently. Other precision casters have mixed their own pattern materials. When starting on a small scale, use of a generally accepted commercial blend is recommended for the sake of uniformity.

Refractory mold materials are prepared for commercial distribution by manufacturing firms who have gained wide experience over a period of years in the dental casting field. Large volume consumption has already reduced the price of these materials far below rates originally established for the dental trade. The formulas for some of these investments are protected by patents. Uniform production of investment material requires facilities for volume mixing and preparation along with close checking and control of raw materials going into the compound and of the compound itself. This is provided by the large commercial manufacturers.

Some casting firms have prepared their own steel investments but this has not appeared to keep final costs much below commercial investments. Costs of liquid binders to be used with silica sands have been high and the need for precoating patterns offsets savings derived from low material costs.

High Heat Properties

(*Continued from Page* 87)

temperature, will produce a fixed deformation in a fixed time.

The need for accurate temperature control is shown by the fact that for some loads an increase of 10° F in temperature may double the creep rate. The effect of an increase in stress upon the creep rate at a given temperature is also very large. The time for the test should never be less than 1 per cent and preferably 5 to 10 per cent of the estimated life of the material in service.

From the creep rates for the stresses used as determined at a single temperature by a 1000 to 3000-hour test, the stress producing the maximum creep permitted for the expected life, say 10,000 to 50,000 hours, is arrived at by extrapolation of the curve obtained by plotting stress vs time. A whole family of curves is needed in order to see what behavior may reasonably be expected at different loads or different temperatures.

Creep is usually reported as the stress producing 1 per cent elongation in 10,000 or 100,000 hours, or preferably 0.1 per cent or 0.01 per cent in 1000 hours. The different criteria are used because the permissible percentage deformation varies with the type of service and the expected service life. There is considerable question about the accuracy of such extrapolations as outlined above.

However, if the creep rate is determined carefully for various stresses, and plotted on a log log scale, the values arrived at by extrapolation can be used provided a suitable factor of safety is applied. Precise temperature control, accurate load measurement, and sufficiently extended periods of test are now so generally adopted, that serious variations in results due to faulty laboratory technique are seldom met in results of creep tests made with modern precautions.

Three typical creep curves, marked to show the three stages of creep, are shown in Fig. 1. Depending upon the applied load, the material, and the temperature, the curve may turn up as A, where the specimen stretches at an increasing rate until it finally necks down and breaks. It may also turn down as in C, when the rate of elongation decreases with time, or it may continue without curvature, as in B, and give no indication over thousands of hours as to whether the elongation will finally increase as in A or decrease as in C.

The first stage of creep, or the period of stress distribution is represented by a relatively large initial deformation, OS, as slip occurs in the favorable oriented crystals and continues until it affects the less favorably oriented crystals. This slip continues until the rate of slip is uniform, and is much smaller in magnitude than at the start, since the net effect is the same as if the material were actually becoming stronger.

In fact, work hardening sets in. The length of time necessary for stage 1 to be completed varies greatly, but is often as much as 500 hours, unless, of course, the material is so weak at the test load and temperature, that it extends so fast that even in a short time it is obvious that the material is not suitable to resist those conditions at which it is being tested.

Stage 2 represents an approximate balance between strain-hardening and recrystallization, and may continue for thousands of hours. During this stage, creep is at about a constant rate, and this rate is the value used in engineering design. However, for good design, the initial amount of deformation must also be considered. In this stage the strain-hardening strengthens the metal, so that the extremely tiny reductions in cross-section, occurring as the material stretches, are overbalanced.

In the final stage, if, after a period of time, the recrystallization tendency, and

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its concomitant softening, is stronger, the creep increases until the specimen finally necks down and breaks. If the strain-hardening tendency is stronger, the rate of deformation decreases, and the curve turns down as in C.

It has been found that coarse grained carbon and low-alloy steels resist creep better than fine grained materials, especially if a coarse-grained austenite is produced before transformation to a stable constituent at room temperature. In the austenitic materials, grain size is also important. It must be remembered, however, that coarsening the grain will reduce the impact resistance and possibly the fatigue strength, and a suitable compromise must be worked out.

Carbon steels are generally not used for resistance to creep at temperatures above 1000°F, since their structure is unstable, and since they lack resistance to oxidation at elevated temperatures. The amount of carbon present in these steels is not very important, although carbon up to 0.40 per cent increases the high-temperature strength, but the structure is important.

Lamellar pearlite, in which the cementite is present as relatively coarse plates, is preferred to a structure in which the carbides are present in the form of spheroids. Since continual high temperature service has the effect of a very prolonged draw, it naturally softens a quench hardened steel. An attempt is therefore made to stabilize the structure at a temperature above that of service.

Since complete stabilization involves not only annealing, but also spheroidization, either of which sacrifices strength, the pearlitic steels are made as stable as possible without annealing by normalizing and then drawing at a temperature below Ac_1, but well above the operating temperature. Bolting materials, however, require a high yield strength due to the "relaxation effect" and must be used in the quenched and tempered condition.

An example of "relaxation" is the phenomenon whereby the bolts in a flanged joint, say in a pipe line, which have been tightened when the line was cold, will stretch or "relax" when the line is brought up to temperature, so that the joint leaks. This is really a form of creep.

Moreover, it is characteristic of the first stage of creep, where a large, permanent set occurs when the material is first loaded at elevated temperature. The creep strength of carbon steels can be increased by the addition of small amounts of molybdenum or tungsten. The creep strength of the low alloy steels is also low, but it too can be improved by these additions.

The austenitic steels such as 18-8, and the more highly alloyed chromium-nickel steels have much higher creep strengths than any of the other ferrous materials, and can be improved still further by additions of 2 to 5 per cent molybdenum or tungsten. The austenitic alloys are the only ones which can be used for heat resistance between 1200° and 2100°F. It is the structure of austenite which appears to account for the low creep rates.

However, it has been shown by Bain[3] that small proportions of the carbide-forming elements such as titanium, colombium, molybdenum, and tungsten increase markedly the resistance to permanent softening at elevated temperatures. A series of curves demonstrating this fact for molybdenum is shown in Fig. 2. The carbide-forming elements improve elevated temperature strength by the formation of a second precipitated compound, after the high temperature has caused the iron carbide to coalesce to a degree no longer very effective as a hardener.

These carbide particles agglomerate slowly even at temperatures up to 1800°F, and are thus able to remain very small and so very effective as a hardening dispersion at high temperatures. Further proof of the fact that it is the carbide forming properties of these elements which produce the resistance to softening, is the fact that without the presence of sufficient carbon to form a hardening dispersion, a very considerable proportion of dissolved elements is necessary to produce similar creep resistance.

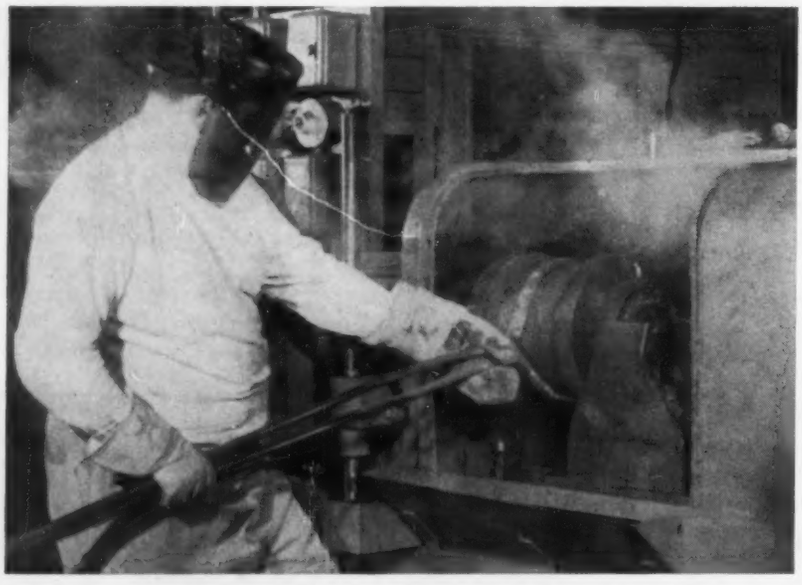
Short-Time Tensile Tests

The short-time elevated-temperature properties of ferrous and nonferrous materials, as determined by the short-time tensile tests, have been investigated more thoroughly than their creep properties. The test methods are somewhat similar to those used for creep testing as described above, but are considerably simpler and more rapid. In general, the hardness and strength of all metals vary inversely as the temperature, while ductility varies directly with the temperature. The magnitudes of the changes vary with the material, its structure, and, of course, the temperature.

The changes are not always uniform, either. For instance, the tensile and yield strengths of carbon steels increase at temperatures between 300 and 600°F. (the blue brittleness range) and then decrease at higher temperatures. The endurance limit and the modulus of elasticity also decrease with temperature. In general, most ferrous materials, including the austenitic steels, may have only 25 to 50 per cent of their room temperature strength at temperatures between 1200 and 1400°F. This fact is illustrated in Fig. 3.

Short-time tensile properties give the metallurgist a rough preliminary estimate of elevated-temperature stability, and may indicate to the engineer the ability of a material to withstand occasional brief overloads or occasional brief periods of increased temperature, but unfortunately do not indicate the load carrying ability for an extended period, and cannot be used to replace creep tests. While all shortcut tests give some useful information, they bear no sure relationship to creep.

Some feel that as creep testing is a precision method which gives precision



BEARINGS BY GRAPHITE: This view of operator placing a heavy walled bearing in a spinner for centrifugal casting was taken from a moving picture, "Bearings by Graphite," recently released by Cleveland Graphite Bronze Co.,

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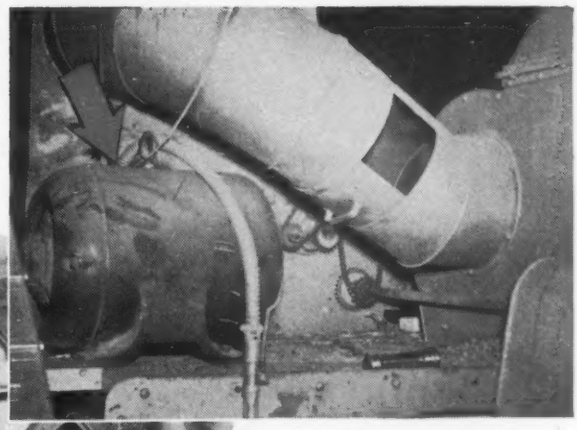
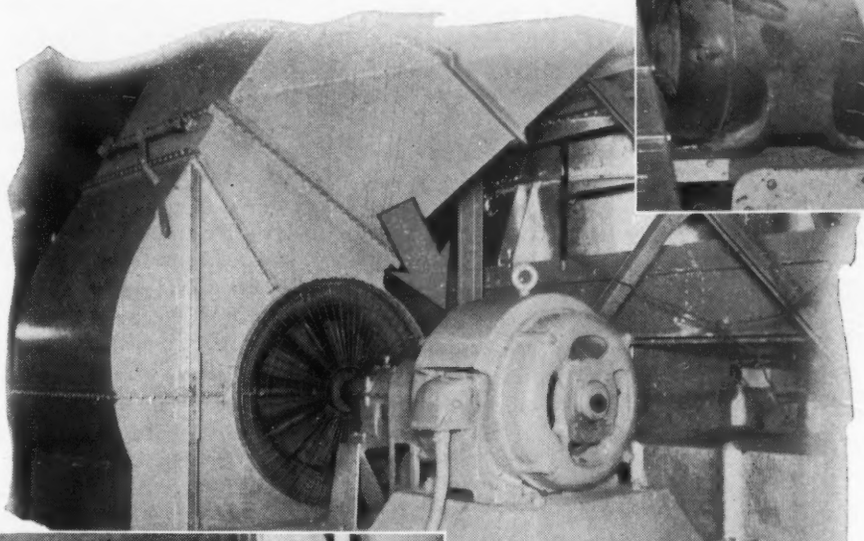
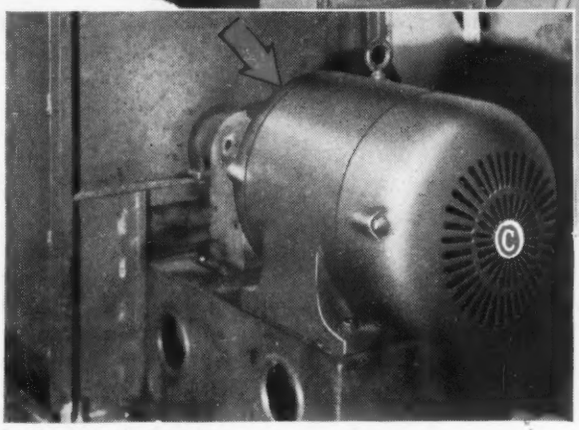


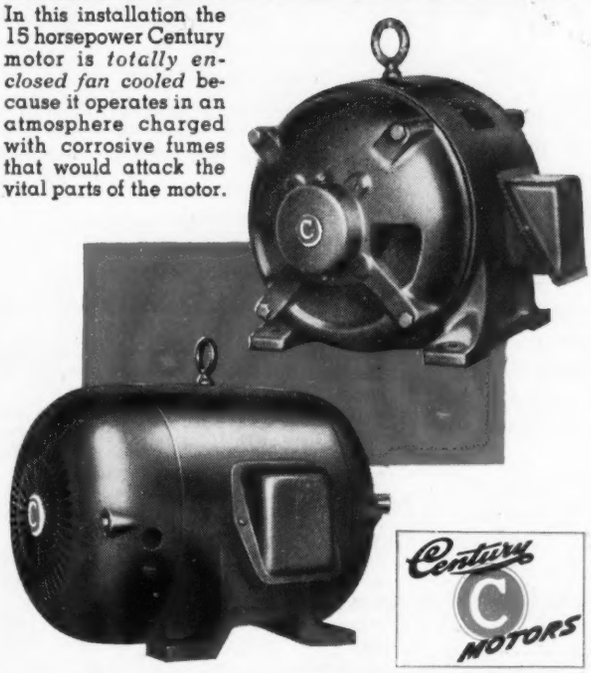
This 5 horsepower Century motor operates a conveyor in a grain elevator in an atmosphere charged with explosive dust.



Because this Century 200 horsepower motor operates a blower in the boiler house of a large generating plant it is *protected from falling objects* and dripping liquids.



In this installation the 15 horsepower Century motor is *totally enclosed fan cooled* because it operates in an atmosphere charged with corrosive fumes that would attack the vital parts of the motor.



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DEGASIFIERS: In these brick-lined retorts metallic parts for x-ray tubes are roasted to remove occluded gas. If allowed to remain, this gas would be emitted under service conditions later and would seriously shorten the tube's life. Here a worker controls the loading and unloading of deoxidizing furnaces in the Mt. Vernon, N. Y. plant of North American Philips Co. Inc.

results when properly conducted, such results are only necessary where close tolerances will exist in the parts to be operated at elevated temperatures. However, there is an enormous field in petroleum refineries and elsewhere where close tolerances are not required, or where service life is short, and where slight distortion of parts is of no consequence.

Where such conditions prevail, stress-rupture tests have received much attention, and may even be said to fulfill a distinct need. In the case of heating coil tubes, the rupture test is considered by many as being more useful than creep testing, since it outlines the regions of stress and temperature within which actual failures may be expected and further, it indicates whether or not a ductile type failure will occur.

As the name implies, "rupture tests" are made by applying varying loads to a number of specimens held at a constant temperature until rupture occurs. The time and stress required to produce failure in each bar is plotted. The elongation during the test and accompanying the rupture is often recorded also, and throws some light on the ductility of the material.

An accurate evaluation of the merits of such tests as these cannot be made until more literature on the subject is accumulated. Meanwhile, anyone interested in the design of equipment, and conscious of the danger attending failures of such equipment, will probably tend to use creep data in conjunction with data from rupture tests. A comparison of the results of creep tests and rupture tests for 18-8 is shown in Table 1.

From the preceding discussion, it is developed that creep tests, rupture tests, and relaxation tests are employed in evaluating steels for use at temperatures above 650 to 700°F. Below those temperatures, it is generally recognized that steels can be treated as elastic bodies, and design can be based on using a safety factor in connection with the ultimate strength as determined in short-time tests.

For temperatures up to about 1300°F 18-8 is used. For service above 1300°F, other austenitic but more highly alloyed materials are used. One of the most common varieties used in oil refineries contains about 28 per cent chromium with 12 per cent nickel. This composition appears to give economical life in such parts which operate at temperatures of 1600 to 1800°F. Compositions of the 25-20 type alloy are used for temperatures from 1800 to 2000°F. All these austenitic alloys also possess a high degree of resistance to sulphur attack at elevated temperatures.

Elevated temperatures not only cause creep, but also produce the phenomenon known as "scaling". Table II reports the scaling temperatures of the stainless steels under consideration, and shows that the temperatures are roughly proportional to the amount of chromium present in the steel.

Tests to determine the amount of scaling of various metals are conducted by heating the materials to be tested at the desired test temperature for a period of time, usually about fifty hours. The material may be tested in air, or in any other atmosphere which may be of interest. The amount of scaling is determined by measuring the gain or loss in weight, usually expressed as milligrams per square centimeter.

The scaling temperatures reported in Table II are those which lead to spalling of the oxide formed. All the stainless steels exhibit temper colors, showing the presence of a tightly adhering oxide or scale at lower temperatures. The high coefficients of expansion possessed by the austenitic alloys causes considerable movement on repeated heating and cooling, and thus considerable flaking of the scale. The coefficient of expansion of the 18-8 steels is almost 50 per cent greater than that of ordinary steels, between 0 to 1000°C.

The flaking action permits progressive oxidation, but the addition of 2 to 3 per cent of silicon improves the resistance to oxidation, making the chromium-nickel-silicon steel a wise choice for elevated temperature service where resistance to oxidation is of paramount importance. Silicon tends to reduce the impact strength on repeated heating in the range from 1110 to 1650°F, but increasing the nickel from 8 to 10 per cent helps to correct this condition caused by silicon.

It can be seen therefore that austenitic stainless steels are important wherever service conditions indicate their need. As design stresses and temperatures become increasingly severe, the need for more highly alloyed materials becomes even more apparent, and the increased strength and resistance to both creep and oxidation possessed by the austenitic alloys are found most valuable. It may be said in fact, that many modern operations and processes would be impossible without alloys of this type to resist the tremendous temperatures and stresses which are encountered.

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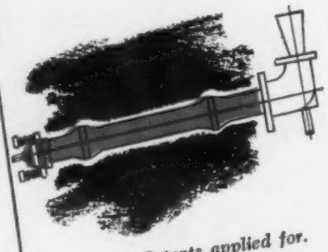

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Magnesium Alloys

(*Continued from Page* 91)

adjustment where dies are made from materials having a different coefficient of expansion. This makes it possible to correct the size of parts which are slightly outside permissible tolerance limits because of material variations or errors in die construction.

High strength properties are obtained in magnesium sheet by cold working in the rolling process at the mill. When hard-rolled sheet is used in highly stressed parts, the parts must be designed to permit forming at temperatures which do not result in excessive annealing. Parts which are not highly stressed, or parts requiring severe deformation are made in annealed sheet which may be heated to high temperatures without affecting inherent metal properties.

Cutting Methods for Magnesium: Magnesium sheet may be cut by means of blanking dies, blade shears, routers, saws, or special types of rotary shears. Selection of method generally depends on such factors as the number of parts to be run, gage, alloy and temper of the material, and intricacy of shape. Magnesium extrusions are usually cut to length by means of band saws or circle saws. Routers are used in taking lengthwise cuts as, for example, in machining tapered wing stringers.

Blanking dies for magnesium are similar to those used for other metals. Mild steel, tool steel and Kirksite are used in making dies; choice is determined by the thickness of sheet, and number of pieces to be run. For maximum edge smoothness punch and die are made of unequal hardness material so a sheared-in fit providing minimum clearance can be obtained. For machine finished dies clearance should preferably be held to less than 5 per cent of the metal thickness to be blanked.

In shears, the top blade should be ground with an included angle of from 45 to 60 degrees. The shear blade should be kept sharp by limiting its use to materials which will not dull its edge. Arc welded magnesium alloy sheet should not be sheared across a bead because of danger of striking small tungsten particles which may have been embedded in the sheet during the welding operation. Conventional circle shears and nibblers should not be used on magesium alloy sheet because they produce a rough, cracked edge.

Special circle shears employing an inclined arrangement of shafts and cutters which cut as cleanly as a blanking die, are available, however. Thickness limitations for shear cutting operations are set at a maxmum of 0.064-in. for

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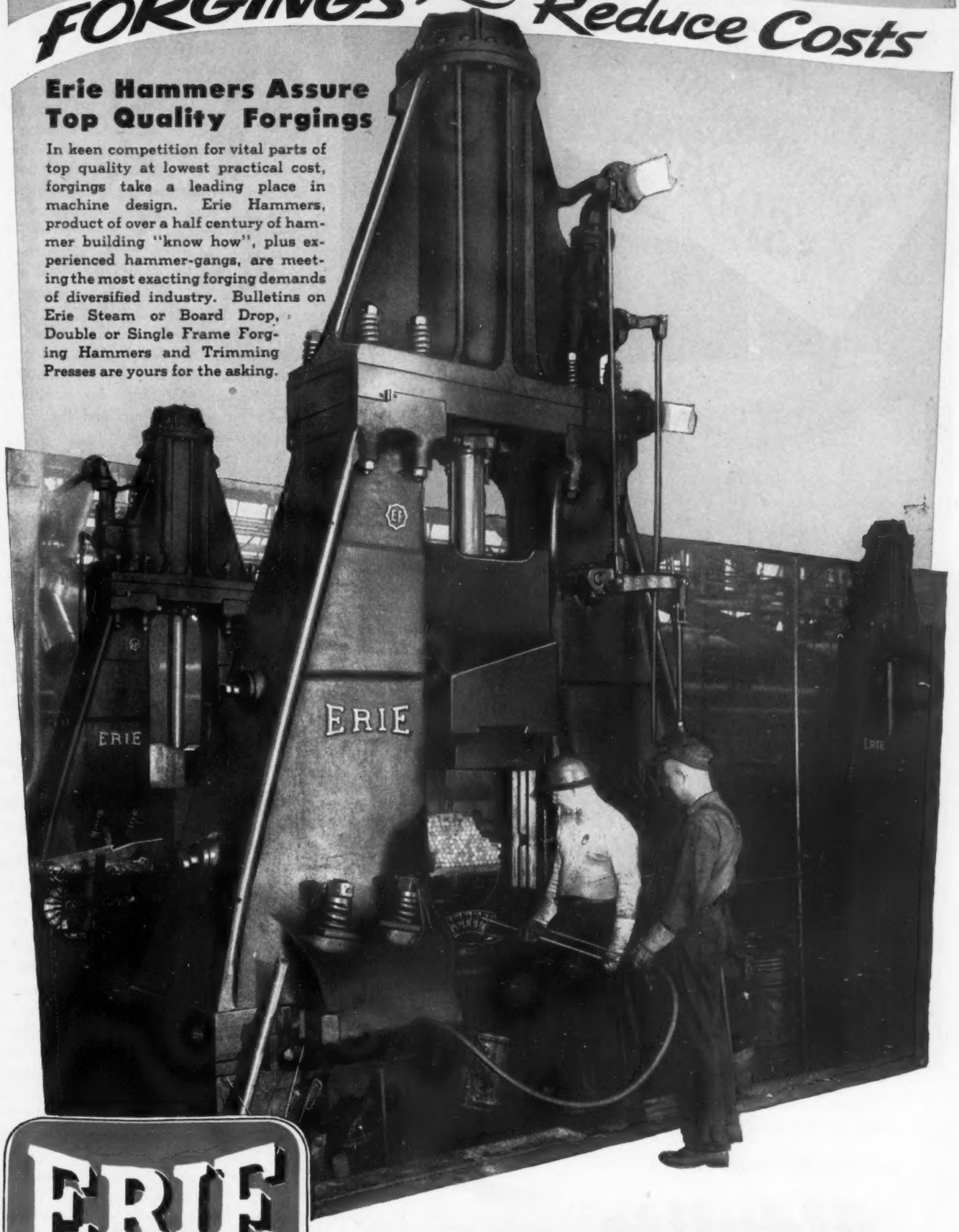

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hard-rolled sheet and ⅛-in. for annealed sheet. These thickness limitations may be exceeded if provisions are made to shear the metal while it is heated or if a second light shaving cut is taken to clean up the rough edge.

Routing may be accomplished satisfactorily on all type routers. Router bit should be a single or double flute type with smooth polished flutes to provide good chip removal. Both straight flute and up to 15-degree spiral flute routers are used successfully. Straight flute type cuts slightly faster, but the spiral flute type, which pulls the chips from the work, has less tendency to load up. Router bits 1/4 or 5/16-in. in diameter are used at speeds of 600 to 20,000 rpm. A low viscosity mineral oil coolant is recommended for less load-up, and provides against fire hazards. Dry routing may be done with little fire hazard if router bit is kept sharp and the chips are thrown free of bit.

Saws of all types are readily used for cutting magnesium alloy sheet and extrusions. When cutting plate or heavy extrusions pitch and set are greater than in other metalworking saws. In cutting this material, band saw raker set blades of four to six-tooth pitch are recommended. In cutting sheet, band saw blades of the type used for cutting steel are satisfactory. Either straight set or raker set blades having about eight teeth per inch are used for fast cutting and about 14 teeth per inch are used where a relatively smooth edge is desired. Circular cut-off saws for small and medium size extrusions have a pitch of about six teeth per inch. Band saws should be provided with a nonsparking blade guide to eliminate the danger of sparks igniting the sawdust.

Drawing Operations: Hydraulic presses fitted with blank holding rams or cushions are used for drawing and forming work on magnesium alloy sheet. This type press is particularly applicable for parts requiring the slow uniform speeds obtained with typical hydraulic presses, about 2 to 4 fpm. Such speeds are needed in making deep draws, forming parts such as boxes with small radius corners, and in making parts for which material must be severely stretched to make the shape. Mechanical presses fitted with hydropneumatic or pneumatic cushions for certain types of work are equal or superior to slow hydraulic presses.

Parts which tend to pucker on the punch, for example those having irregular rounding contours, have been formed with less trouble on a toggle press having an average punch speed of 60 fpm than on hydraulic presses operating at 3 fpm. The reduced puckering is probably due to the fact that the greater speed gives less chance for the unsup-

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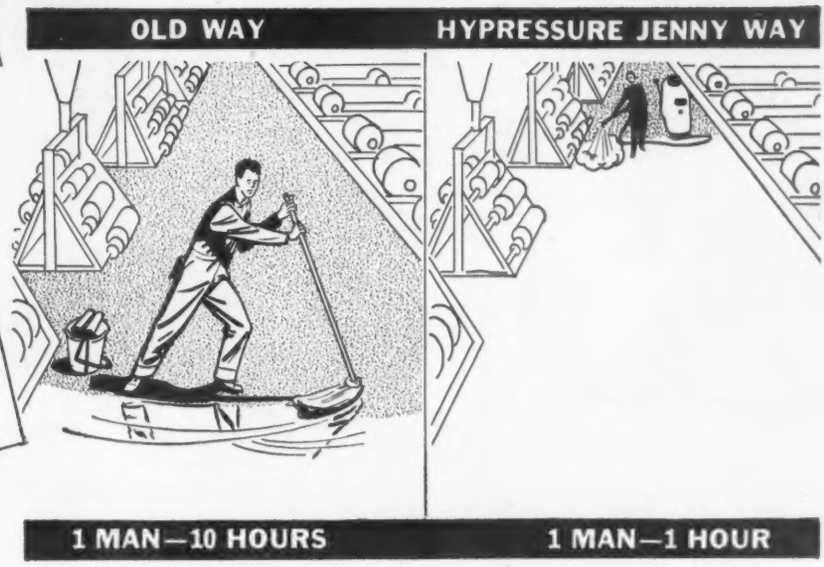

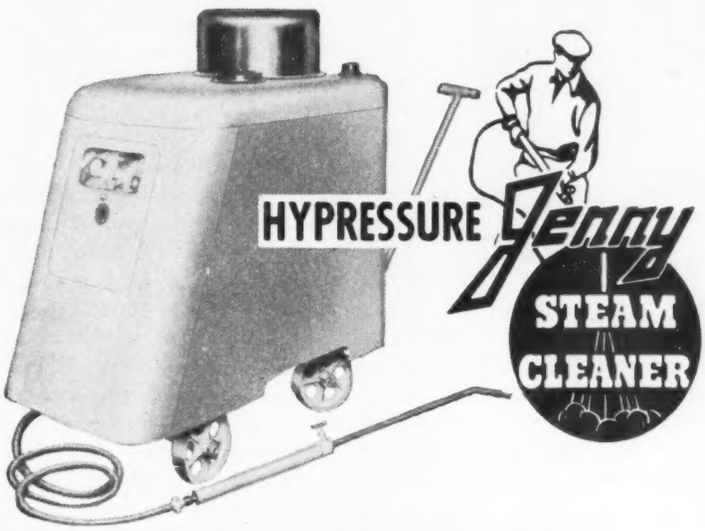

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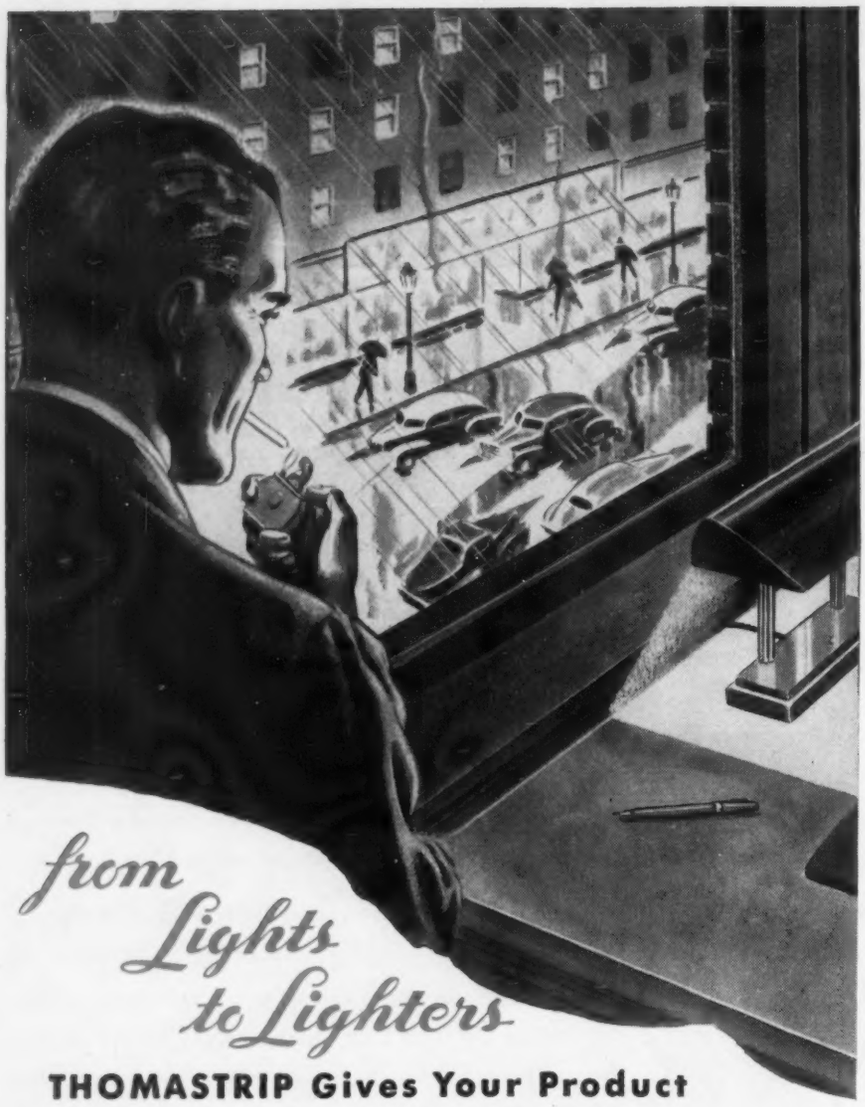

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ported metal between the nose of the punch and the radius of the draw ring to cool and increase the puckering tendency. There is also a definite advantage in using a mechanical press because of increased production rates[15].

Drawing and Forming Dies: Dies for working magnesium alloy sheet must have provisions for heating and allowance must be made for difference in coefficients of expansion when materials other than magnesium alloys are used in the dies. When it is physically possible to form the material to the punch by the pull exerted on the blank by the pressure ring and draw ring, an open type die is used, that is, the female die does not bottom on the punch. The only time mating dies are used is in forming parts having re-entrant portions which could not be made by other means.

Pressure rings and draw rings are usually made from mild steel plates. In making dies from mild steel it is important that the material be stress relieved at 1200°F (650°C) for one hour and air-cooled before finish machining to relieve stresses which might cause die warp in service. Even though stress relieved, some mild steels do distort slightly in service, in which cases heat resistant steels (not hardened) and Meehanite cast iron have been used to some extent.

Punches are made from steel, cast iron, magnesium alloys and aluminum alloys. Magnesium alloys are used more than the other materials because they have the advantages of good machinability; they do not need correction for expanson due to heat; and especially in large dies, their low weight facilities setup and removal of the punch from the press. Since the coefficient of expansion of magnesium alloys is greater than that of steel and aluminum, allowance for the difference must be made when using the latter materials in die construction.

In designing dies all dimensions which affect part sizes should be multiplied by an experimentally determined factor of 1.004 for steel and cast iron and 1.002 for cast aluminum when the dies are to be operated at 600°F (315°C). If the dies are to be run at temperatures other than 600°F the factor should be corrected proportionately.

Shown in Fig. 42 is a typical die used for magnesium alloy forming operations. In building up a die, if the pedestals are to be welded construction they should be rough machined and stress relieved before taking a finish cut to insure parallel surfaces. Danger of warpage because of welding stresses in the working parts of the die is eliminated by connecting these parts with bolts.

Distance between pedestal supports or

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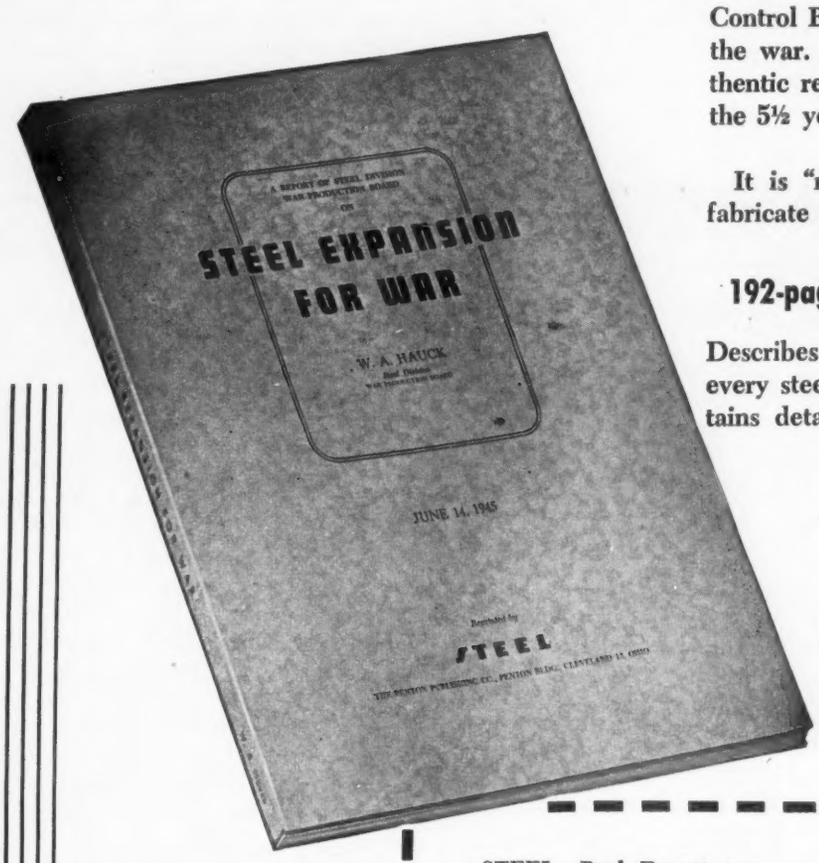

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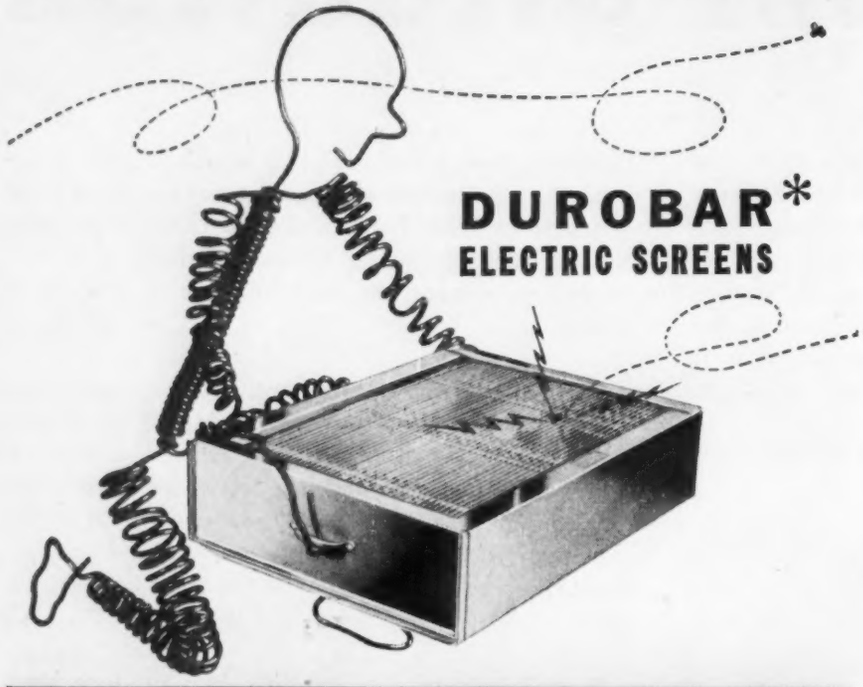

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between support and the edge of the die should not as a general rule exceed four times the thickness of the draw ring plate. Location of supports on a draw ring pedestal is determined, to a certain extent, by the location of the pressure pins. Pedestal supports should be located as nearly as possible in line with these pins. Total minimum cross section in the draw ring pedestal supports may be determined by the formula:

$$A = \frac{\text{(Blank area—area of die opening)}}{30}$$

The load on the punch is quite low and unless a bottoming die is used its pedestal need only be heavy enough to insure rigidity. If bottoming is required the pedestal should be designed for the maximum ram load which will be placed on the punch.

Pedestal plates are usually made from 1-in. steel. The size of the draw ring and pressure ring should be made larger than the calculated blank size. Blank size can be quite accurately determined by making the area of the blank equal to the surface area of the formed part, allowing sufficient material for trim and for the material formed to the draw ring radius plus about a 1 to 2-in. holdback flange on parts which are not pushed through the draw rings.

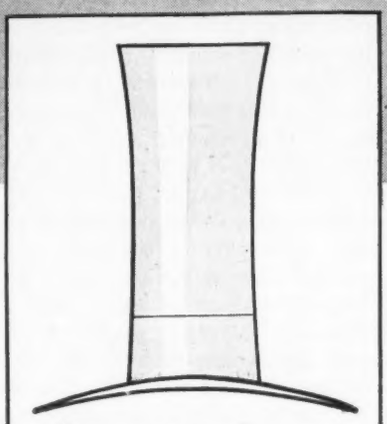
TABLE XXII
PLATE THICKNESS FOR DIE RINGS

Largest Blank Dimension (Inches)	Minimum Plate Thickness (Inches)
0-14	1.50
14-22	2.0
22-30	2.5
30 and over	3.0

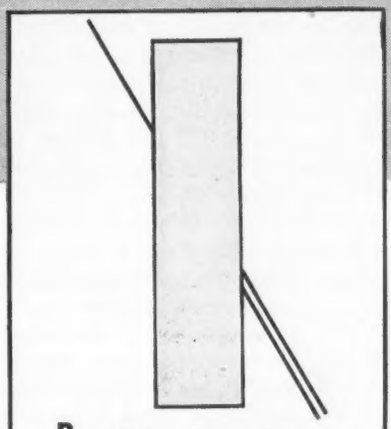
Footings should be provided where pressure pins are connected to a pressure ring, as shown in Fig. 42, to provide maximum uniformity of pressure distribution. It is important that pressure be distributed as evenly as possible to control the tendency to wrinkle between the pressure plates and to maintain uniform material thickness in the drawn part. The minimum thicknesses of plates used for mild steel draw rings and pressure rings are listed in Table XXII, based on recommendation of Dow Chemical Co. These thicknesses are for stock before machining, therefore finished thicknesses will be slightly less. Plate less than 1.5-in. thick is not used because of danger of distortion upon application of heat.

The radius of the draw rings should be made from 5t to 7t, where t is the thickness of the metal to be formed, in order to allow for maximum drawability. Radii as small as 1t and a great deal larger than 7t are used successfully on draws where the flange is desired in the finished part. Radii outside the 4t and 7t

How is Your "Eye Cue" on Measurements?



A. How does the vertical dimension compare with the horizontal?



B. Which oblique line on right is a prolongation of that on left?

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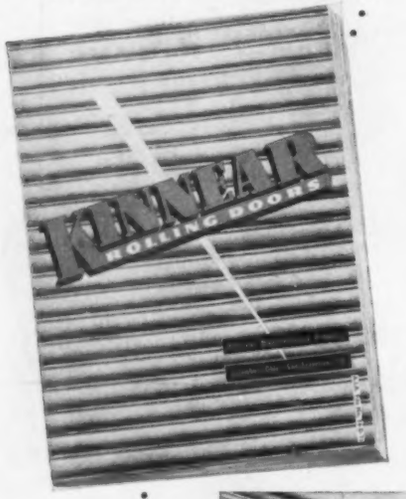

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limits increases drawing resistance and limits the depth of draw. Radii larger than 7t also increase the tendency to pucker in some parts. Box shapes should be designed with corner and bottom radii larger than 3t as a general rule, although flat bottomed parts are made successfully with bottom radii as small as 1t.

Clearance between punch and die is a function of depth of draw. For maximum depth draws the clearance should be made equal to 0.25 to 0.35 times the metal thickness being drawn plus stock thickness.

For production work dies are heated by means of electricity or gas, and permanent temperature controlling and indicating devices installed. Electric heaters are very satisfactory but in cases where relatively high temperatures are required it is sometimes difficult to install sufficient heating elements because of the shape of the die. Both cartridge type heaters mounted on holes drilled into the die and strip heaters clamped to the surface of the die, are used. Section is made according to the shape of the part to be heated.

Gas heating is accomplished by means of gas burners attached to the die in such a manner that the flames impinge on the surfaces to be heated. Gas manifolds are fitted to presses to be used for hot drawing work. A sufficient number of mixing and control units is provided for maximum number of burners to be used. One burner generally is used on the draw ring and one on the pressure ring. Whether a burner will be required in the punch or not depends on the type of draw. In general, the burner should not be placed closer than 2 in. to the inside of a draw ring because heat from the burner might overheat the part being formed. In locating thermocouples for the controlling devices care should be taken to place them to give the correct die temperature. They should not be placed nearer than 2 in. to a burner unless a shield is provided to protect them from the flame.

When cold sheet is used, stock to be drawn is preheated to eliminate the pause required for heating in dies, to maintain uniform die temperature, and to gain uniform stock temperatures. In the case of round-bottomed parts, preheating is essential to provide heat in that area of the sheet not in contact with the punch or draw ring, which is very susceptible to puckering if not heated to the proper temperature.

While heating of flat sheet may be accomplished in atmospheric ovens, a preferred method is to heat the sheet by pressing it between flat metal plates to take advantage of rapid heat transfer. It is important to place preheating ovens as close to the press as possible so minimum time will be consumed in getting a heated blank into the die. This is especially true of thin sheet where the temperature drop is very rapid.

Drawing Die Lubrication: Colloidal graphite suspended in a volatile carrier was found most satisfactory as a drawing lubricant. One mixture used quite extensively is made up of about 2 per cent colloidal graphite by weight suspended in either a low boiling point naphtha or in alcohol. This mixture is sprayed on sheet surfaces requiring lubrication by means of a standard paint spray gun, in quantities sufficient to provide a uniform black surface.

Application of the lubricant by means other than a paint gun is not recommended because it is difficult to get the thickness and uniformity of coating required. The volatile carrier evaporates very rapidly and leaves a fine film of colloidal graphite which stays on during the drawing operation and provides good lubrication and freedom from scoring without fouling the die. Die surfaces are lubricated and cleaned occasionally during operation. A graphitized lubricant is rubbed on working surfaces by means of an asbestos pad. Cleaning is accomplished by means of a fine emery cloth.

The graphite coating on formed parts is removed as soon as possible after the forming operation by a 0.5 to 2-min dip in a 15 to 20 per cent chromic acid bath used at room temperature. Chromic acid does not attack graphite or magnesium alloys but it does attack the magnesium hydroxide coating between the base metal and the graphite coat. This action breaks the bond between graphite and part. Graphite usually breaks free in the bath, although on some parts which have been severely ironed, a light rub with steel wool is required to effect complete removal.

Parts should not be left in the bath much over the recommended time limit because the graphite-magnesium junction results in galvanic action; slight pitting will occur. A 3 per cent addition of sodium, potassium, calcium, or magnesium nitrate appreciably improves the cleaning action of the bath. This addition is essential if parts to be cleaned are made from pickled sheet. The absence of the magnesium hydroxide coating makes the plain chromic acid bath ineffective.

(*Continued in later issue*)

REFERENCE

15. Trans. Am. Soc. Metals 35 p. 230 (1944).

—o—

Brass fittings for connecting copper, steel, aluminum and other thin-wall metal tubing, with forged bodies on elbows and tees and Dryseal pipe threads on pipe thread ends, are announced by Imperial Brass Mfg. Co. 1200 West Harrison street, Chicago. Dense, close-grained structure of metal insures against porosity and blow holes.

Progressive Die Operation

(*Concluded from Page 89*)

before being reworked and reground.

By gathering the metal between blades, as shown in Fig. 1, normal 1½-in. spacing between blades is reduced to ¾-in., providing additional strength and increased blower efficiency which depends upon blade area. A sacrifice of blade area means a sacrifice of air delivery against static pressure. Blades are 1 1/32-in. wide; the gathers are ⅜-in. deep and finished section is about 10⅛-in. wide, having been reduced from 10 25/32 by the flanging and twisting.

Blade sections are transported in lots of 200 by fork lift truck from the press room to the assembly floor where they are rolled on a motor-driven rolling fixture. The fixture forms sections into cylinders to conform to the diameter of the rim sizes, checks spacing and pitch of blades. Rolled sections shown in Fig. 3 just behind the operator are ready for assembly to the end rings.

Channel-shaped end rings shown in finished wheel, Fig. 7, are complete stampings except for rivets and set screws. Rings 10⅝-in. diameter are stamped from hot-rolled, extra deep-drawing quality sheet steel 11½ x 46 in. long, sheared to make three or four pieces. Stamping operations performed on a 125-ton Toledo press consist of blanking, drawing, perforating, forming inlet vanes, and piercing rivet holes. Varying pitch inlet vanes are built something like airplane propellers to help draw air into the fan. Channel ⅜-in. deep is engineered to add strength and balance to the wheels. Hub design includes two formed washers riveted to the end ring.

Blade sections are spot welded to end rings using a model N-12-30 Taylor-Winfield 30 kva rocker arm automatic spot welder with a jig designed by plant engineers, Figs. 4 and 5. In order to clear channels on the rings, the positioning fixture is constructed to allow lateral, vertical, vertical and lateral movements of the rocker arm in one cycle. Production is at the rate of one wheel every 3 min. According to company engineers, spot welding adds strength and rigidity, making the wheel literally one piece.

Completed wheels, looking like squirrel cages, Fig. 7, are placed on racks and rolled by gravity to the inspection and balancing department. To reduce operating vibration, wheels are held to 1/32-in. run out and the bore to 0.002-in. Great care must be exercised in the inspection of the wheels. A variation of about 2 degrees in the critical pitch of blades would affect air delivery.

In the paint shop wheels moving on a continuous conveyor are dipped, usually in aluminum paint in a 200-gal tank, and dried in infra-red ovens as shown in Fig. 6. After painting, wheels are packed in crates or cartons for shipment.

Index to Wartime Developments Offered

A comprehensive index guide to the many thousands of reports on wartime technological developments in the United States, Germany and other countries has been prepared and is available from the Office of Technical Services, Department of Commerce. Intended for use with the OTS weekly bibliography of scientific and industrial reports, it contains about 455,000 cross reference entries classified under major subject headings.

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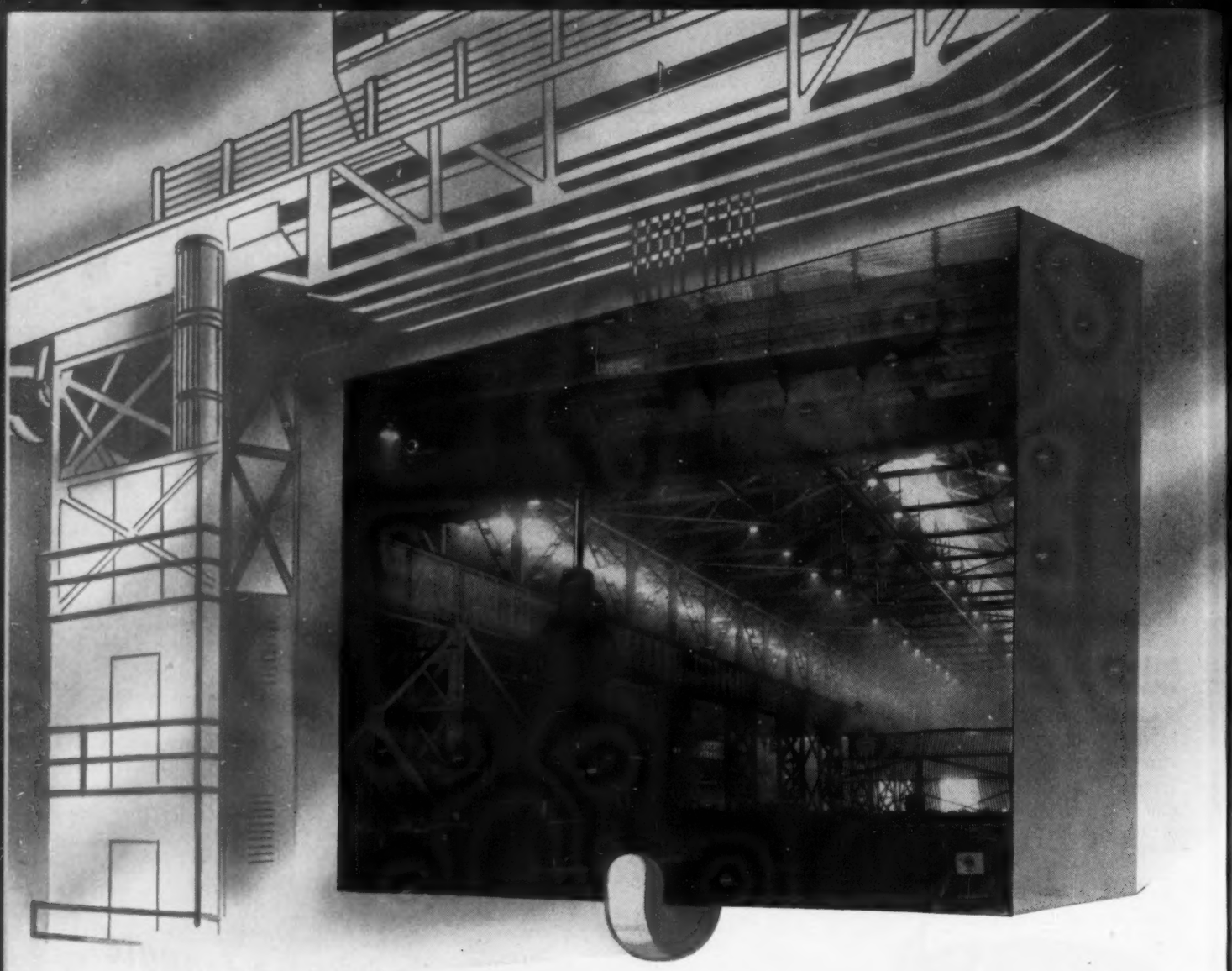


Alliance—world's largest crane builder—gives you another *first* in crane design

● One of the newer developments of The Alliance Machine Company is this 300-ton, 100' span, electro-hydraulic forge crane. Located in the steel works of one of the country's largest steel corporations, it's used to handle forgings under a 7,000-ton capacity forging press.

This crane is of unique design inasmuch as the hydraulic pump is located on the trolley, the pump being driven by a series motor. Every movement of the crane is directed by remote control, the operator being stationed on the floor, near the press.

With the pump located on the trolley, this crane has the same range of operation as a standard electric overhead traveling crane. Heretofore, cranes of this type obtained hydraulic power from a pump located on the floor, this power being conveyed by means of walking pipes which limited the range of operation. Formerly, all hydraulic cranes were lowered by gravity only, with no pressure applied in the lowering direction. The new Alliance crane shown here has pressure applied on the hoist cylinder in both the lowering and hoisting directions.

Attached to the lower end of the piston rod is a power-driven turning rig, over which a link chain functions. This link chain supports the ingot to be forged under the press. The motor for turning this rig is located on the trolley of the crane, and power is conveyed through a spline shaft in the hollow piston rod.

Contact Alliance—world's largest builder of the world's largest cranes—for complete information on this new development in electro-hydraulic forge cranes.

THE ALLIANCE MACHINE COMPANY

Main Office: Alliance, Ohio ★ Pittsburgh Office: 1622 Oliver Bldg.

LADLE CRANES • GANTRY CRANES • FORGING MANIPULATORS
SOAKING PIT CRANES • STRIPPER CRANES • SLAB AND BILLET
CHARGING MACHINES • OPEN HEARTH CHARGING MACHINES
SPECIAL MILL MACHINERY • STRUCTURAL FABRICATION

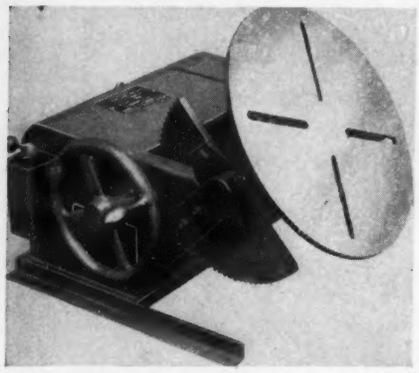
Alliance

New Products and Equipment

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 140

1. Power Operated Positioner

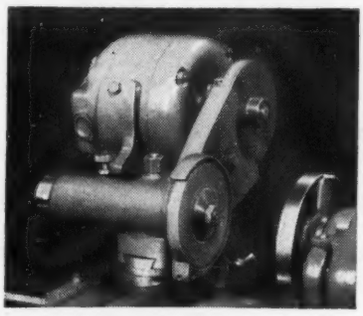
Welding, assembling, repairing, grinding, hard surfacing and other similar operations are facilitated with the newest power-operated bench model positioner offered by Ransome Machinery Co. division of Worthington Pump & Machinery Corp., Dunellen, N. J. Built to handle work weighing 100 lb or less, it may be



tilted to 135 degrees, locking in any position at any degree of tilt. Identified as model 1-P, it may also be revolved 360 degrees by a 1/8-hp single phase reversible motor. A disengaging clutch permits free wheeling when desired. Lever operated varidrive pulley permits a speed range from 0.21 to 5 rpm.

2. Grinding Attachment

An electric grinding attachment for use on lathes and other machine tools developed by South Bend Lathe Works 390 East Madison street, South Bend 22, Ind., facilitates precision external grinding operation. Equipped with a 1/2

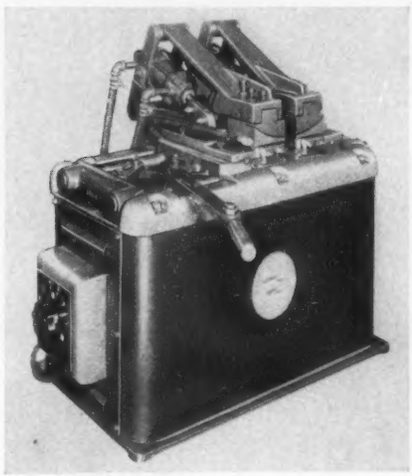


x 4-in. grinding wheel driven by a constant speed 1/4-hp motor, its grinding wheel spindle runs on prelubricated sealed ball bearings.

Tension adjustment of the attachment is provided for V-belt which connects motor and wheel spindle, both of which are enclosed in a single guard. Spring stops for grinding straight and spiral fluted reamers and cutters, diamond dressers for truing the grinding wheel and dresser holding fixtures also can be supplied with the attachment. Wheels for grinding various materials are offered as cup wheels for reamer and cutter grinding.

3. Butt Welder

Featuring eight ranges of heat, round steel guides for movable platen in oilite bushings, ample grease outlets and convenient built-in tap switch, a compact new bench type butt welded manufactured by Banner Products Co., 4965 North 29th street, Milwaukee 9, is offered for either



220 or 440 v, 60 cycle current. Head is of high strength bronze, water cooled, and has good conductivity. Transformer is water cooled with asbestos shield.

Alignment of work is assured through use of 2 in. diameter air block on clamping jobs. Blocks maintain constant pressure on material being welded. Operation is started by a covered foot switch connected to a 4-way solenoid air valve which brings clamps into position.

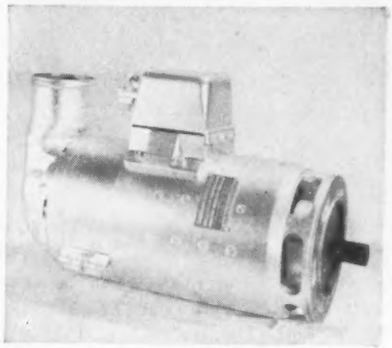
4. Electronic Servomechanism

Infinite sensitivity that can be applied to the automatic control or regulation of a large variety of practical problems to eliminate need for human supervision is possible with the Motron model 61A electronic servomechanism made by W. C. Robinette Co., 802 Fair Oaks avenue, South Pasadena, Calif. Several miniature vacuum tubes directly control speed and direction of a 1/15 hp induction motor.

Input dial is mounted on ball bearings and may be rotated by extremely small forces, such as electrical meter movements, flow gages, weighing balances, synchronous electric clocks, etc. Motor velocity in either direction may be limited from zero to maximum independent of input dial setting, so that hunting instability can never occur.

5. Aircraft Generator

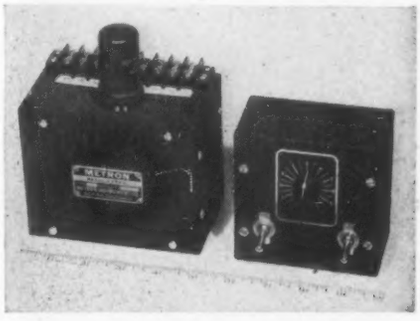
Direct-current aircraft generator, rated at 300 amp, 30 v, which operates over a speed range of 3000 to 9000 rpm is offered by Westinghouse Electric Corp.,



Aviation Division, Lima, O. Weighing 58 lb, it is compensated with both interpole and pole face windings that make possible exceptional overload capacity and commutation properties. Altitude treated brushes are used and a quick-disconnect mounting flange facilitates installation. Frame is 6½-in. in diameter and overall length is 14 17/32-in.

6. Small Welding Timer

Welding and industrial timers designed for the equipment manufacturer, exceptionally small and permitting highly versatile application, are manufactured by



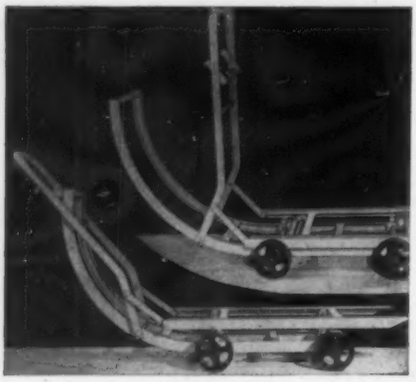
Metron Instrument Co., 432 Lincoln street, Denver 9. The control box, measuring 4 x 4 x 2 in., may be mounted with bracket or incorporated in machine by flush mounting in any panel surface near operator with timer box mounted any-

where. Control box also may be fastened to timer box for mounting as a unit.

Timing intervals from 1/60 sec up to several minutes can be provided in one or several continuously variable ranges. Adjustability by steps or fixed interval timers are also offered.

7. Handlift Truck

Useful for handling short move jobs involving loads up to 1 ton in factories and warehouses, a light handlift truck announced by Arcade Mfg. Division of Rockwell Mfg. Co., Freeport, Ill., may be used for moving skid loads, boxes and



trays of material and countless miscellaneous items. Overall length of truck is 70 in. and platform area is 11¾ by 43 in.

With platform lowered, truck has ample clearance under a skid-box. An easy pull lifts the load above the wheels and locks it securely.

8. Cabinet Planer

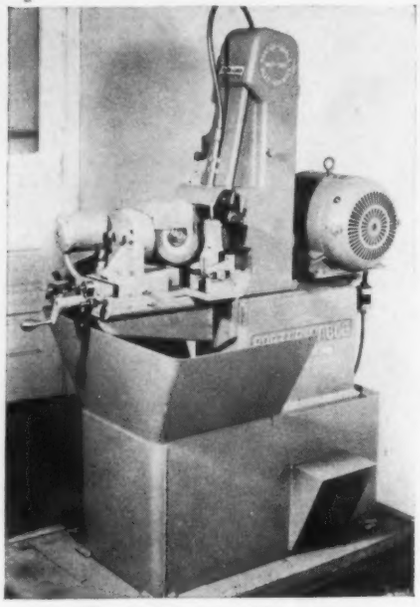
Single surface cabinet planer, No. 105, manufactured by Baxter D. Whitney & Son Inc., Winchendon, Mass., is designed for use in maintenance departments, ship-

ping rooms, pattern shops, etc. Built in 24 in. width, it is of medium capacity with a one-piece base and integrally cast upper and lower wedge assemblies. It has a 4-knife round cutterhead and four gear-driven feed rolls as well as sectional infeed roll and chipbreaker.

Planer's micro-fed selector gives any feed desired between 20 and 60 fpm. Dial feed indicator, finger tip controls, built-in cutterhead and feed motors and electric knife grinder are incorporated into design. It is shipped ready to wire and start running.

9. Wet Belt Grinder

A centerless wet belt grinder with an endless abrasive belt operating over a resilient contact roll, both of which are balanced to cut uniformly, is announced by Porter-Cable Machine Co., Syracuse, N. Y. With the work done by the belt, the contact roll, which backs up the belt,



remains flat across and square at the corners.

As unit maintains a balanced condition, setting up is simplified, allowing operation by less experienced persons. Resiliency of contact roll eliminates chatter. A semi-hard roll is recommended for accurate grinding. Machine will handle a variety of operations and range of sizes, through work of short pieces, ¾ to 2 in. lengths, and longer with proper support. Diameters from 3/32 to 2¼-in. may be handled.

10. Kilovoltmeters

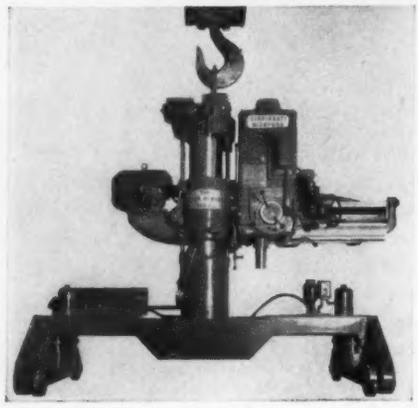
Series of high sensitivity kilovoltmeters for measuring in electronic circuits is announced by Shallcross Mfg. Co., Collingdale, Pa. All instruments in the series are portable, and draw little current from the circuits in making high-voltage measurements.

A typical unit is the No. 760-A kilovoltmeter. In has three scales of 5, 10 and 20 kv with a sensitivity of 10,000 ohms per volt. Instrument draws 100 microamperes at full scale. Besides a polarity reversing switch, facilities are provided for connecting an external meter where required.

Eight kilovoltmeters in the line include both direct current types as well as alternating and direct current types in practically any required voltage combination. Multiplier sections are insulated from panels by ceramic insulators. Accuracy of the instruments is 2 per cent for direct-current measurements and 5 per cent for alternating-current measurements.

11. Radial Drill

Cincinnati Bickford Tool Co., Cincinnati 9, announces a super service radial drill mounted on a prefabricated steel gondola base. The 4-ft arm, 13-in. diameter column portable drill has a 110 ⅛-in.

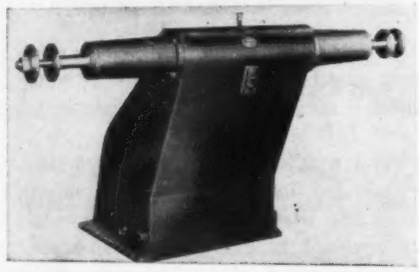


wide base with hardened steel wheels, power clamping and power traverse at rate of 24 fpm with push button control located at the head of the machine.

Machine has a shortened column and a large lifting bail attached to a steel cap. As can be seen from illustration, machine and base hanging by bail hook is well balanced. This is a standard machine on a special type base.

12. Overhang Buffer

A new heavy duty overhang buffer, adapted to long and deep work requiring maximum clearance, is offered by Bradford Machine Tool Co., Cincinnati 4.



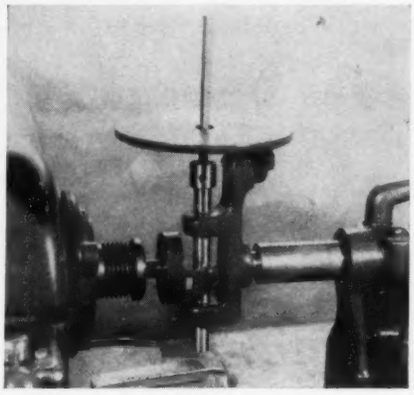
Known as model 661, it is belt driven by a ball bearing motor. Motor platform is adjustable for belt tension. Design permits drive belts to be changed without

removing housing from shaft.

Buffer is equipped with shaft lock, magnetic starter, overload protection and under voltage release. It is produced in power ranges from 3 to 20 hp. Speed is 2400 rpm or to specifications. Motor is 220, 440 or 550 v, 2 or 3 phase, 50 or 60 cycles.

13. Filing Attachment

An attachment for converting a lathe into a die filer, sawfiler (both hand and circular) and a hack saw is being offered by Carey-Anslinger Mfg. Co., 1129 East

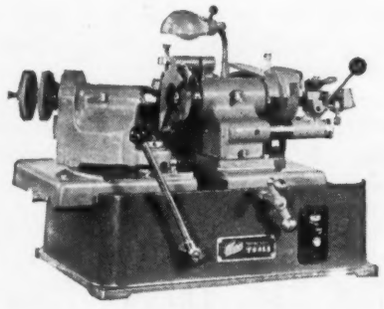


Bourbonnais street, Kankakee, Ill. It is attached to the lathe in the same manner as a drill or chuck, without use of clamps or removing any part of the lathe.

Tail stock of the lathe supports the main assembly and work table, the driving mechanism being chucked in the head stock in either a chuck or collet. Driven at any speed the lathe will run, its stroke is ⅞-in. Saw filing is accomplished by tilting the table and rotating the file to produce the proper compound angle. Constructed of cast iron, it has Oilite bearings and ground shafts.

14. Valve Seat Refacer

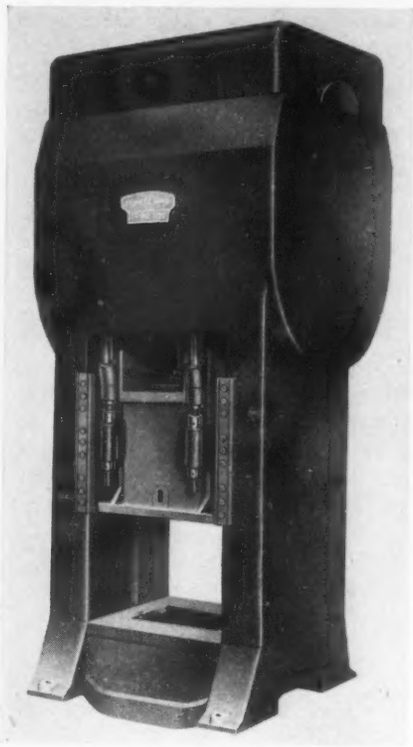
Featuring a dual electric motor design, sturdy slide rods and solid, balanced construction, the Thor valve re-



facer, offered by Independent Pneumatic Tool Co., 600 West Jackson boulevard, Chicago 6, provides high precision valve refinishing. A feature is the 4-in-1 butt end grinding attachment which provides, as a unit, settings for four separate operations—grinding the rocker arm, tappet, valve stem and dressing the wheel.

15. Toggle Press

Equipped with an electrically-controlled, air-operated friction clutch, the single point double action toggle press designed by Cleveland Punch & Shear Works Co., Cleveland 14, has all gears



enclosed in a box type crown, together with the drive unit. Its top cover can be removed easily for making repairs.

While machine illustrated has a 28-in. stroke, a 6-in. adjustment, 500-ton inner slide capacity and 300-ton outer slide capacity, it can be furnished in sizes and capacities to suit various requirements. It is made with a single connection as shown, or with two connections.

16. Bench Grinder

Featuring a small diameter motor, and the absence of any projections in the working area between the grinding

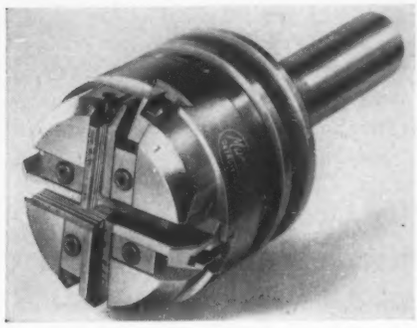
FOR MORE INFORMATION
on products and equipment described in this section, fill in a card following page 140.

wheels, a bench grinder announced by Bardco Mfg. & Sales Co., 2450 East 23rd street, Los Angeles, permits using the grinding wheel much longer. Grinder base and motor housing are cast aluminum, smoothly designed to shed dust and metal particles.

Grinder models with 7, 8 or 10-in. wheels are in production. These provide speeds of 3600 rpm. Standard equipment on each model includes two high speed organic bond wheels, one coarse and one medium, two enclosed wheel guards with adjustable tool rests and spark shields and a built-in toggle switch.

17. Chaser Die Heads

New tangent chaser die heads developed by Murchey Machine & Tool Co., Detroit, enable chasers and chaser holding blocks to be removed or replaced

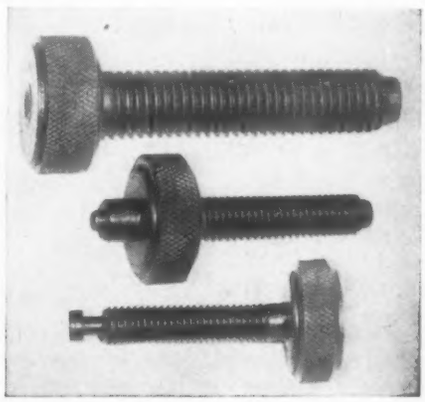


quickly, usually without removing tool from the machine. Die heads are furnished in revolving and stationary types with chasers and holding blocks interchangeable.

Illustrated is type TRB, a rotating yoke operated tool for use on automatic screw machines, drill presses, or any machine where the tool revolves. Chasers of a given pitch may be used to cut any size within the range of the head.

18. Torque Thumb Screws

Supporting or clamping screw with a ratchet head that operates without distortion to fixture or part is offered by Vlier



Mfg. Co., 4552 Beverly boulevard, Los Angeles 4. It is made in various sizes, and types with varying threads and end pressures from 10 to 28 lb. The screw

can be used from outside or inside a fixture or supporting frame. Its use with lock nuts is possible in installations where vibration is apt to affect settings. Types offered are standard, inverted and V-block (illustrated top, middle, bottom, respectively).

19. CUTTING AND GRINDING OIL

Mixing with water of any degree of hardness, new Silver-Chip No. 60 cutting and grinding oil, produced by Machinery Lubricants Inc., 31 St. James avenue, Boston 16, offers a true solution instead of an emulsion. Water mixtures as high as 1 to 100 provide good lubrication and transparency.

20. CARBIDE TIPPED TOOLS

A line of single point tools with carbide tipped inserted tool bits is announced by O. K. Tool Co., Shelton, Conn. Tips are designed for quick change for turning, boring or facing. They are ground for immediate use and to meet varying characteristics of the metal or material to be machined.

21. HIGH PRESSURE HOSE

Flexible hose strongly reinforced to withstand pressure of 800 psi has been developed by United States Rubber Co., New York, for use on high pressure washing equipment. It is constructed with a synthetic rubber tube compounded to resist hot water, soapy solutions and chemicals. The hose is offered in three sizes—⅜, ½ and ¾-in. ID.

22. GLASS CIRCLE CUTTER

A device for cutting circles of various sizes in glass is announced by E. Karelsen Inc., 125 West 45th street, New York 19. Machine, consisting of a semicast steel arm holding cutting implement, mounted on a ¾-in. plywood base, is supplied to cut circles of any size up to 8, 15, 24 or 32 in. with base boards of corresponding size.

23. POCKET MICROSCOPE

Constructed of stainess steel, the streamlined pocket microscope manufactured by Schneider-Cogswell Inc., 1849 North Halsted street, Chcago 14, fits the pocket like a pencil. Called the Ederscope, its convenient size enables it to be on the job whenever needed.

24. QUICK ACTING VISE

An accurately machined dove-tail slide with adjustable gibs to prevent sliding is a feature of the quick acting bench vise manufactured by Reypo Corp., 9900 Lincoln boulevard, Los Angeles 45. Its rear jaw can be set in two positions. Both jaws are fitted with removable inserts. Quick action is obtained by pushing barrel and screw assembly until jaws contact work, then turning screw. Height of the vise is 2 in., its jaw width is 1¼-in. and jaw opening, 1 1/8-in. Various accessories are also offered with the vise.

25. HIGH PRESSURE LUBRICANT

A metal working lubricant developed for extremely high pressures and/or high temperatures is announced by G. W. Smith & Sons, 5400 Kemp road, Dayton 3. It is effective for such applications as hot drawing, hot piercing punches, hot forging, deep drawing and other jobs. Known as Die Slick No. 5, it withstands pressures of 100,000 psi and can be used with temperatures up to 2300° F. Applied with brush, swab or spray, it prevents sticking and is noncorrosive and noncarbon-forming.

26. MINE DRILL

A new mine tool, developed by Ingersoll-Rand Co., New York, has a percussion type detachable drill bit set with cemented carbide inserts, supplied by Carboloy Co. Inc., Detroit. New bits drill blast holes quickly, permit uninterrupted drilling for complete length of each drill rod, drill more holes with same air consumption and reduce drill maintenance. Four-point bit is interchangeable with other I-R Jackbits.

27. MULTIANGLE VISE

Made of semisteel castings with interchangeable and reversible hardened machine steel vise jaws, a new multiangle vise with a 2-in. jaw opening is offered by Manufacturers Engineering Service Inc., Toledo 4, O. Also available is a work table which fits vise base, the table measuring 4 x 5 in. Vise and table swivel throughout 360 degrees and will tilt 45 degrees or more.

28. GROUND FLAT STOCK

Precision ground flat stock available from L. S. Starrett Co., Athol, Mass., includes oil and water hardening types. Former is a nondeforming, electric furnace tool steel, fully spheroidized annealed with fine grain structure. Latter type is a high grade tool steel specially made and annealed for easy machining It develops maximum hardness when quenched in water or brine. Both are supplied in pieces 18 in. long, widths from ½ to 6 in. and in thicknesses from 1/64 to 1 in.

29. BEARING ASSEMBLIES

Monoball two-piece bearing assemblies, consisting of hard chromium-plated ball enclosed in a one-piece race of high strength steel or stainless steel, are manufactured by Southwest Products Co., 10 South Cataline avenue, Pasadena 1, Calif. They are designed for installations with oscillating rods and tubes of low rpm, where lubrication by oil or grease is not possible and wherever alignment is expensive to attain or where rigidity is desired. Bearing bore sizes range from 3/16 to 3 in. and accommodate ultimate loads from 7000 to 500,000 lb.

30. MERCURY SWITCH

A new mercury switch, less than 1½-in. long and capable of handling almost any switching job, is announced by Minneapolis-Honeywell Regulator Co., Minneapolis 8. It is rated at 1 amp for 115 v ac. Switch is actuated by a snap tilt of 12 degrees using a single pole, single throw action. It is identified as No. AS-408D.

31. FINGER RING CUTTER

Cutter designed to remove finger rings from injured fingers prior to surgery or first aid is offered by Industrial Products Co., 2833 North Fourth street, Philadelphia 33. It quickly cuts through rings or all common metals including Monel and stainless steel. Cutter operates by turning saw arbor clockwise and feeding saw gently into ring with attached lever. Instrument has replaceable saw blade and may be sterilized.

32. CAST IRON WELDING

Usable in all welding positions, a new electrode for welding cast iron where the weld must be machineable, is announced by General Electric Co., Schenectady 5, N. Y. Designated as W-2075, it is composed of pure nickel core wire and an extruded black covering which is largely consumed in the arc, producing little slag. Stabilizing ingredients used in covering make it useful on alternating current and on reverse polarity direct current.

33. REFRACTORY CEMENT

An air setting refractory cement, manufactured by Building Materials Division, Armstrong Cork Co., Lancaster, Pa., is recommended as a bonding mortar with fire brick and insulating fire brick. It has a cold bonding strength of over three times the 200 psi required by American Society for Testing Materials specifications. Super duty (2910° F) requirements of American Refractories Institute are met. Cement is thoroughly mixed and shipped in 16, 50, 95 and 185 lb steel drums.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in this card. It will receive prompt attention.

Helpful Literature

48. Mold & Hob Steels

Henry Disston & Sons, Inc.—6-page illustrated folder "Disston Mold and Hob Steels" presents data on Plastiron, Plastalloy and Plastikut mold steels and Nicroman and Croloy hob steels.

49. High Speed Camera

Eastman Kodak Co.—20-page illustrated pamphlet "Eastman High-Speed Camera Type III" discusses need for motion analysis, shows uses of high speed motion pictures in industrial research and production and presents details on type III camera.

50. Metal Degreasing

E. I. du Pont de Nemours & Co.—10-page illustrated booklet "Metal Degreasing with Chlorinated Solvents" discusses design, installation and operation of metal parts degreasing machines; and properties and use of Trichlorethylene solvent for use in these machines.

51. Brass Die Castings

Doehler-Jarvis Corp.—4-page illustrated folder "Outstanding Achievements with Brass Die Castings" shows examples of typical brass die cast parts and discusses experience and facilities of company.

52. Feedwater Control

Bailey Meter Co.—16-page illustrated bulletin No. 105-B lists advantages and explains operation of Bailey three-element feedwater control which maintains water level under all boiler rates.

53. Industrial Heaters

Dravo Corp. — 12-page illustrated bulletin No. 516 describes Counterflo self-contained direct fired warm air heating unit. It explains use of stainless steel in combustion chambers, combustion method, fuel convertibility and elimination of refractory lining within combustion chamber.

54. Gearing Motion Picture

Fellows Gear Shaper Co.—12-page illustrated booklet on 16-millimeter sound motion picture "The Art of Generating and Gear Manufacturing Equipment" describes this two-reel 55-minute film which deals with theory, design, tooth action and contact of gears, and their production and inspection.

55. Foam Preventive

Dow Corning Corp. — 4-page illustrated folder "DC Anti-Foam A" presents information on Antifoam A silicone compound for prevention and suppression of foam in aqueous systems. It remains effective in steam distillation and vacuum evaporation.

56. Hydraulic Power Unit

John S. Barnes Corp.—2-page illustrated bulletin No. 305-U presents details, specifications and installation data on Rapidraulic Junior hydraulic clamp unit for actuating chucks and clamp cylinders and for other applications requiring large volume of fluid in short time interval. Holding pressures of up to 500 pounds per square inch can be delivered.

57. Press Brakes

Cincinnati Shaper Co.—64-page illustrated plastic bound catalog No. B-2 presents data on complete line of Cincinnati press brakes, illustrates typical and unusual forming jobs accomplished on machines, shows wide range of dies and gives other information on applications.

58. Blast Furnace Stove

William M. Bailey Co.—6-page illustrated bulletin describes blast furnace stove which provides shell and dome construction which allows best possible method of installing insulation and brickwork, as well as maximum stability of brickwork in combustion and checker chambers.

59. Stainless Steel Fastening

Anti-Corrosive Metal Products Co.—40-page illustrated catalog presents information on complete line of aviation and commercial stainless steel fastenings available in all analyses of stainless steel from type 302 to type 502 and of Durimet, Hastelloy, etc. Stock lists and discount sheet are enclosed.

60. Industrial Services

Designers for Industry, Inc.—20-page illustrated booklet "DFI Planned Products Service" discusses services which include industrial design; development, production and industrial engineering; experimental manufacturing; management counsel; market analysis; technical surveys; industrial research; distribution planning; retail stores and new products.

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STEEL—Penton Building, Cleveland 13, Ohio 4-21

Please send ☐ Literature ☐ Price information ☐ Nearest source of supply on the items circled at the left.

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COMPANY _____

PRODUCTS MANUFACTURED _____

ADDRESS _____

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HELPFUL LITERATURE

61. Process Instruments

Bristol Co. — Illustrated bulletin No. W1811 lists recording thermometers, pyrometers, pressure gages, voltmeters, ammeters, pH recorders, recording controllers, indicating controllers, miscellaneous instruments and accessories which are available from stock.

62. Inspection System

Arma Corp. — Illustrated folder describes Limitron system for inspection and sorting of parts on production and assembly lines and in receiving rooms. Component assemblies which can be combined to fit individual requirements are shown.

63. Industrial Service

Atlas Metal Stamping Co.—Illustrated broadside "A Load Off Your Shoulders onto Ours" describes engineering, designing, production, inspection, assembly and testing facilities of company.

64. Large Forming Press

Chambersburg Engineering Co. — 14-page illustrated bulletin No. 2-L-6 describes construction and lists technical data on Cecostamp air-operated impact machine on which wide variety of metal shapes can be made from all formable metals.

65. Electrical Tools

Bradford Machine Tool Co.—32-page illustrated catalog No. 50 presents information on Metalmaster ball bearing drills, heavy duty bench and pedestal grinders, carbide tool grinder, disk grinders, special purpose machines, buffers and polishers, flexible shaft equipment, attachments and accessories.

66. Pulverizers & Crushers

Brooks Equipment & Mfg. Co. — Illustrated folder No. 47-A covers features and gives specifications of Day pulverizers and swing hammer crushers which are constructed for heavy duty operations.

67. Spectrophotometer

Boder Scientific Co. — 4-page illustrated bulletin No. B208 is price list for Coleman universal spectrophotometer and electronic photofluorometer, and for accessories which can be used with these two instruments.

68. Machine Tools

Benchmaster Mfg. Co.—8-page illustrated bulletin describes line of small bench machines which includes inclinable presses that stamp, crimp, mark, punch, rivet and form; milling machines that are converted easily from vertical to horizontal type; and bench machine accessories such as rotary tables, collets and swivel vises.

69. Materials Handling

American MonoRail Co.—8-page illustrated bulletin No. MF-1 describes wartime developments of monorail type cranes. Applications for various types of peace-time materials handling are outlined.

70. Electric Lift Truck

Automatic Transportation Co.—6-page illustrated folder No. 1006 gives complete details regarding design, operation and features of new Skylift electric truck which lifts, tiers and moves up to 4000 pounds with maximum lift of 130 inches. Collapsed height of truck is 83 inches.

71. Dust Control

American Air Filter Co.—20-page illustrated bulletin No. 272-A covers type D Roto-Clone dynamic precipitator. Unit is particularly adapted to dry collection of practically every type of granular industrial dust. Complete specifications and application data are given.

72. Powder Metal Parts

Chrysler Corp., Amplex Div.—8-page illustrated circular "Oilite Oil Cushion Bearings and Machine Parts" explains advantages and applications of Oilite bronze and iron self-lubricating bearings and machine parts.

73. Castings

Advance Foundry Co.—8-page illustrated bulletin relates advantages of Strenes metal castings for dies and other applications where minimum of machining is desirable. Typical dies and parts are shown.

74. Broaching Machine

American Broach & Machine Co.—8-page illustrated circular No. 100 presents features and operating data on type T American three-way vertical hydraulic broaching machine. Operations to which machine is adaptable include surface broaching and push down and pull down internal operations.

75. Welding Procedure

Ampco Metal, Inc.—Procedure sheets Nos. D2338 and D2327 present data on recommended practices in welding of malleable and cast iron. Featured are uses of Ampco-Trode coated aluminum bronze electrodes and Phos-Trode shielded-arc phosphor bronze electrodes.

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FIRST CLASS PERMIT No. 66 (Sec. 510 P.L.&R.) Cleveland, Ohio

PERCENT OF CAPACITY

Steel Industry's Outlook Blurred by Strike Threat

Hopes still high walkout will be averted despite slow progress of negotiations on new agreement. Steelmaking operations hold at fast pace with demand strong though some signs of easing are noted. Scrap prices continue to sag

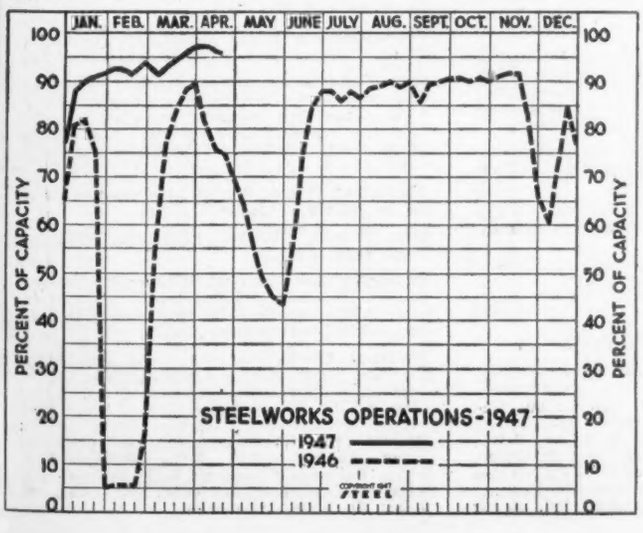
IT IS anyone's guess whether there will be a steel strike Apr. 30 when the present extended contract between the steel companies and the steelworkers' union expires.

Although negotiating time is rapidly running out, hopes are high in industry circles a walkout will be averted before the deadline. While slow progress of negotiations between U. S. Steel Corp. subsidiaries and the union lends a discouraging note, certain offsetting factors in the situation tend to encourage expectations that a compromise will be worked out in the next week or so.

The air should be cleared of much of the uncertainty now prevailing when the union makes known its position this week. Until then, any prediction as to the trend of events belongs solely in the realm of guessing.

Except for the strike threat, the immediate future outlook in steel and metalworking is promising. With resumption of normal coal production the mills appear assured of high operations until at least the end of April, and should a steel strike be averted, continued active production through June seems a certainty. What will happen when the coal mines are returned to private ownership July 1 is problematical since complications threaten in the working out of an agreement between the mine operators and the union.

Meanwhile, steel demand continues strong though here and there signs of an easing in pressure are reported. Consumers are adopting a more cautious buying policy with an eye to holding down inventories. Steel salesmen are reported seeking business more aggressively than for a long time past. Inquiry for sheets, strip, plates, pipe and small bars is as strong as ever, but alloys and certain specialties, such as wire rope, are definitely easier. Assuming steel production continues uninterrupted by strikes, expectations are that fair demand-supply balance will be struck in many products within a few months. Sheets, strip, pipe and plates are exceptions in this respect.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended April 19	Change	Same Week 1946	Same Week 1945
Pittsburgh	98.5	— 2.5	65.5	89.5
Chicago	96	+ 0.5	75	98.5
Eastern Pa.	90.5	None	81	91
Youngstown	86	None	60	91
Wheeling	93.5	None	90.5	92.5
Cleveland	95	— 1	97	94.5
Buffalo	88.5	None	93	90.5
Birmingham	99	None	85	50
New England	95	+ 1	88	92
Cincinnati	82	—10	79	92
St. Louis	87.5	+12.5	54	80
Detroit	92	+ 2	88	86
Estimated national rate	95.5	— 1	74.5	92

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Further easing in scrap was noted last week with prices off $3 per ton at Pittsburgh and offerings at $35 going begging. Indications are the market will go lower, possibly to $30, before it becomes stabilized. In any event, buying is at a virtual standstill, and, significantly, considerable high-priced material from remote points is being rejected by the mills and foundries as off-specification.

Government pressure for steel price reductions continues but except for adjustment of extra cards by independent producers to conform with recent changes initiated by the Carnegie-Illinois Steel Corp. nothing new price-wise has developed. It is pretty well agreed now that no price action is likely until the wage question is settled.

Steelmaking operations dropped 1 point further last week to 95.5 per cent of capacity, due in large measure to shutting down of furnaces for repairs. The operating rate was unchanged at St. Louis at 87.5 per cent based on a revised figure for the week ended Apr. 12. In Detroit, production was off 1 point from the previous week's revised rate of 93 per cent. There has been an appreciable boost in output per furnace at the Ford plant, possibly as much as 10 per cent, presumably the result of rearrangement of certain storage and handling facilities permitting more expeditious handling of metal as it comes from furnaces, thus reducing tap-to-tap time. Operations rose ½ point at Chicago to 96 per cent, sagged 10 points at Cincinnati to 82 per cent, were off 1 point at Cleveland to 95 per cent, were up 1 point at Pittsburgh to 98.5 per cent, and up 1 point in New England to 95 per cent.

STEEL's composite price on steelmaking scrap dropped $1 further last week to $33.92, but the finished steel average held unchanged at $69.82, as did that on semifinished steel at $52.10 and that on steelmaking pig iron at $32.49.

COMPOSITE MARKET AVERAGES

	Apr. 19	Apr. 12	Apr. 5	One Month Ago Mar., 1947	Three Months Ago Jan., 1947	One Year Ago Apr., 1946	Five Years Ago Apr., 1942
Finished Steel	$69.82	$69.82	$69.82	$69.82	$69.53	$63.54	$56.73
Semifinished Steel	52.10	52.10	52.10	52.10	49.45	40.60	36.00
Steelmaking Pig Iron	32.49	32.49	32.49	31.85	29.56	25.50	23.00
Steelmaking Scrap	33.92	34.92	35.58	36.67	31.17	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. **Semifinished Steel Composite:**—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. **Steelmaking Pig Iron Composite:**—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. **Steelworks Scrap Composite:**—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	April 19, 1947	Mar., 1947	Jan., 1947	Apr., 1946
Steel bars, Pittsburgh	2.60c	2.60c	2.60c	2.50c
Steel bars, Philadelphia	2.98	2.98	2.98	2.82
Steel bars, Chicago	2.60	2.60	2.60	2.50
Shapes, Pittsburgh	2.50	2.50	2.462	2.35
Shapes, Philadelphia	2.64	2.64	2.602	2.465
Shapes, Chicago	2.50	2.50	2.462	2.35
Plates, Pittsburgh	2.65	2.65	2.612	2.50
Plates, Philadelphia	2.85	2.85	2.777	2.55
Plates, Chicago	2.65	2.65	2.612	2.50
Sheets, hot-rolled, Pittsburgh	2.50	2.50	2.50	2.425
Sheets, cold-rolled, Pittsburgh	3.20	3.20	3.20	3.275
Sheets, No. 10 galv., Pittsburgh	3.55	3.55	3.55	†4.05
Sheets, hot-rolled, Gary	2.50	2.50	2.50	2.425
Sheets, cold-rolled, Gary	3.20	3.20	3.20	3.275
Sheets, No. 10 galv., Gary	3.55	3.55	3.55	†4.05
Hot-rolled strip, Pittsburgh	2.50	2.50	2.50	2.35
Cold-rolled strip, Pittsburgh	3.20	3.20	3.20	3.05
Bright basic, bess. wire, Pittsburgh	3.425	3.425	3.425	3.05
Wire nails, Pittsburgh	4.125	4.125	4.062	3.25
Tin plate, per base box, Pittsburgh	$5.75	$5.75	$5.75	*$5.25

* Nominal. † Base, No. 24 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$50.00	$50.00	$47.00	$38.00
Slabs, Pittsburgh, Chicago	42.00	42.00	41.25	39.00
Rerolling billets, Pittsburgh	42.00	42.00	41.25	39.00
Wire rods 7/32 to ¼-inch, Pitts.	2.55c	2.55c	2.55c	‡2.30c

‡ Base, No. 5 to 7/32-in.

Pig Iron

	April 19, 1947	Mar., 1947	Jan., 1947	Apr., 1946
Bessemer, del. Pittsburgh	$34.83	$34.83	$31.815	$27.69
Basic, Valley	33.00	33.00	30.00	26.00
Basic, eastern del. Philadelphia	35.52	34.26	31 99	27.84
No. 2 fdry., del. Pgh. N. & S. sides	34.33	34.33	31 315	27.19
No. 2 fdry., del. Philadelphia	36.02	34.76	32.49	28.34
No. 2 foundry, Chicago	33.00	32 50	30.50	26.50
Southern No. 2 Birmingham	29.88	29.28	28 88	26.94
Southern No. 2, del. Cincinnati	34.75	34.15	31 75	28.34
Malleable, Valley	33.50	33.50	30 50	26.50
Malleable, Chicago	33.50	32.90	30.50	26.50
Charcoal, low phos., fob Lyles, Tenn.	40.50	40.50	37.50	33.00
Gray forge, del. McKees Rocks, Pa.	33.66	33.66	30.65	26.55
Ferromanganese, fob cars, Pittsburgh	140.25	140.25	140.00	140.00

Scrap

Heavy melting steel, No. 1, Pittsburgh	$35.00	$36.80	$32.50	$20.00
Heavy melt. Steel, No. 2, E. Pa.	33.50	38.50	31.00	18.75
Heavy melt. steel, Chicago	33.25	34.60	30 00	18.75
Rails for rerolling, Chicago	39.50	40.30	35.69	22.25
No. 1 cast, Chicago	42.50	43.10	41.25	20.00

Coke

Connellsville, furnace ovens	$9.125	$8.875	$8.812	$7.50
Connellsville, foundry ovens	10.375	10.375	9.812	8.25
Chicago, by-product fdry., del.	16.10	16.10	15.912	13.75

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Forging quality, $40, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Canton, $52.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $42; Portsmouth Steel Corp., $55-$60, Portsmouth, O. Detroit, del., $45; eastern Mich., $46.

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $50; Detroit, del., $53; eastern Mich., $54.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $61; del. Detroit $64; eastern Mich., $65.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $50; Portsmouth Steel Corp., $66, Portsmouth, O.

Skelp: Pittsburgh, Sparrows Point, Youngstown, Coatesville, 2.35c per lb.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 7/32 to ¼-in., inclusive $2.55-$2.80 per 100 lb. Galveston base, $2.65. Worcester, add $0.10. San Francisco (base, del.), $3.27.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, Duluth, base, 20 tons one size, 2.60c; Detroit, del., 2.75c; eastern Mich., 2.80c; New York, del., 3.01c; Phila., del., 2.98c, San Francisco (base, del.), 3.33-3.65c; Los Angeles (base, del.), 3.325-3.56c; Seattle, 3.285c, base.

Rail Steel Bars: Price, 2.60c-2.95c, same basing points as merchant carbon bars, except base is 10 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.05c; Detroit, del., 3.20c; eastern Mich., 3.25c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.20c; Detroit, 3.35c; Toledo, 3.40c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 3.80c; Detroit, del., 3.95c; eastern Mich., 4.00c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.45c; San Francisco (base, del.), 3.03c; Los Angeles (base, del.), 3.025c; Seattle, 2.985c, base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.60c-2.95c.

Iron Bars: Single refined, Pittsburgh, 6.15c-†6.70c; double refined, 7.00c-†8.50c; Pittsburgh, staybolt, 7.85c-†10.00c.

† Hand puddled.

Sheets

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c; Philadelphia, del., 2.70c; New York, del., 2.79c; Los Angeles (base, del.), 3.24c; San Francisco, (base, del.), 3.245c. (Andrews Steel Co., quotes Middletown, O., base for shipment to Detroit; Alan Wood Steel Co., Conshohocken, Pa., quotes 3.10c, Sparrows Point, Md., base; Granite City Steel Co., 2.875c, fob Granite City, Ill., 2.775c, fob Gary or Birminbham.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.20c; Granite City, base, 3.30c; Detroit, del., 3.35c; eastern Mich., del., 3.40c; New York, del., 3.61c; Philadelphia, del., 3.58c.

Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, Sparrows Point, Canton, Middletown, base 3.55c; New York, del., 3.84c; Philadelphia, del., 3.75c; Los Angeles (base, del.), 4.32c; San Francisco (base, del.), 4.325c.

Corrugated Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, base, 3.55c.

Culvert Sheets, No. 16, corrugated: Pittsburgh, Chicago, Gary, Birmingham: Copper alloy, 4.15c; copper-iron or pure iron, 4.50c. Granite City base prices 10 points higher. Los Angeles (base, del.), 4.94c; San Francisco (base, del.), 4.945c.

Aluminized Sheets, No. 20 hot-dipped, coils or cut to lengths: Pittsburgh, 9.00c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.55c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.55c; Granite City, base, 3.65c; Detroit, del., 3.70c; eastern Mich., 3.75c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.20c; Kokomo, Ind., 4.30c. Armature: Pittsburgh, Chicago, Gary, 4.50c; Granite City, Ill., Kokomo, Ind., 4.60c. Electrical: Pittsburgh, Chicago, Gary, 5.00c; Granite City, Kokomo, 5.10c. Motor: Pittsburgh, Chicago, Gary, 5.75c; Granite City, 5.85c. Dynamo: Pittsburgh, 6.45; Granite City, 6.55c. Transformer 72, 6.95c; 65, 7.65c; 58, 8.35c; 52, 9.15c, Pittsburgh.

Strip

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c. (Superior Steel Corp., 3.30c, Pittsburgh.)

Cold-Rolled Strip, 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.20c; Chicago, base, 3.30c; Detroit, del., 3.35c; eastern Mich., 3.40c; Worcester, base, 3.40c. (Superior Steel Corp., 4.70c, Pittsburgh.)

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.20c; over 0.40 to 0.60 carbon, 4.70c; over 0.60 to 0.80, 5.30c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., 100-lb base box, $5.75; Granite City, Birmingham, Sparrows Point, $5.85.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 lb tin, $5.05; 0.75 lb tin, $5.25; Granite City, Birmingham, Sparrows Point, $4.95, $5.15, $5.35, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage and lighter, 3.60c; Granite City, Birmingham, Sparrows Point, 3.70c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box $4.90; Granite City, Birmingham, Sparrows Point, $5.00.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb $13.50; 15-lb $15.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.65c; Coatesville, Claymont, Geneva, Utah, 2.80c; New York, del. 2.94c; Phila., del., 2.85c; St. Louis, del., 2.47c; Boston, del., 2.86c; San Francisco and Los Angeles, del., 3.29c-3.46c.

(Central Iron & Steel Co., Harrisburg, Pa., 3.85c, basing points; Alan Wood Steel Co., Conshohocken, Pa., 2.80c, Coatesville and Claymont equivalent.)

Floor Plates: Pittsburgh, Chicago, 3.90c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.787c; Coatesville, 4.15c.

Clad Steel Plates: Coatesville, 10% cladding: nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.50c; New York, del., 2.70c; Phila., del., 2.64c; Geneva, Utah (base, del.), 2.675c; Los Angeles (base, del.), 3.17c-3.41c; Los Angeles and San Francisco (sizes produced at Geneva only), del., 3.14c; Kaiser, del., San Francisco, 3.41c. (Phoenix Iron Co., Phoenixville, Pa., nominally, 4.00c, Bethlehem, Pa., equivalent.)

Steel Piling: Pittsburgh, Chicago, Buffalo, $3 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carlonds

Bright, basic or bessemer .....*$3.30-$3.55
Spring (except Birmingham) **$4.25

Wire Products to Trade

Nails and Staples

Standard and cement-coated.....†$3.75-$4.50
Galvanized .....‡$3.75-$4.50

Wire, Merchant Quality
Annealed (6 to 8 base) ..... §$3.95
Galvanized (6 to 8 base) ..... §$4.40
(Fob Pittsburgh, Chicago, Birmingham, per base column)
Woven fence, 15 gage and heavier .... ††84
Barbed wire, 80-rod spool ..... ††94
Barbless wire, twisted 94
Fence posts (no clamps)..... ††90
Bale ties, single loop ..... ††86

* Worcester, $3.40, Duluth, $3.35, base. San Francisco (base, del.) $4.31 for bright basic only.

** Worcester $4.35, Duluth and Trenton, N. J., $4.50, base. San Francisco (base, del.) $5.63 for MB spring wire; $5.28, black premier.

† Worcester $4.05, Cleveland $3.85, base. San Francisco (base del.) $4.83.

‡ Duluth $3.75, Cleveland $3.85, base. San Francisco (base, del.) $4.83.

§ Worcester $4.05, annealed; $4.50, galvanized. Duluth $3.95, annealed; $4.40, galvanized base. San Francisco (base, del.) $4.96, annealed; $5.41, galvanized.

†† San Francisco (base, del.): Woven fence, 107; barbed wire, 114; bale ties, 110. Duluth (base): Woven fence, 84; barbed wire, 94; fence posts, 90.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.50 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $2.85 per 100 lb; light rails (rail steel), $2.95, Williamsport, Pa.
Relaying, 60 lb and over, fob railroad and basing point, $46-$49 per net ton.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill; $3.15 base, Seattle. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30-6.40c.

Tubular Goods

Standard Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

Butt Weld

Steel In.	Blk.	Gal.	Iron In.	Blk.	Gal.
⅛	48	23	¼	— 2	+20
¼ & ⅜	51	30½	⅜	—11½	+10
½	55½	41	½	—17	+ 2
¾	58½	45	¾	—22½	— 1½
1-3	60½	47½	1	—23	— 2
			1¼	— 1	+20
			1½	— 7	+13
			2	—14½	+ 5½
			2½-3½	—17	+ 1½
			4	—21	— 4
			4½-8	—19	— 2½
			9-12	—10	+ 7

Lap Weld

Steel In.	Blk.	Gal.	Iron In.	Blk.	Gal.
2	53	39½	1¼	— 1	+20
2½-3	56	42½	1½	— 7	+13
3½-6	58	44½	2	—14½	+ 5½
*8	58	42½	2½-3½	—17	+ 1½
*10	57½	42	4	—21	— 4
*12	56½	41	4½-8	—19	— 2½
			9-12	—10	+ 7

* Not T. & C.

Seamless

Steel In.	Blk.	Gal.	In.	Blk.	Gal.
2	52	38½	*8	57	42
2½-3	55	41½	*10	56½	42
3½-6	57	43½	*12	55½	41

* Not T. & C.

Line Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Seamless	In.	Butt Weld
2	51	⅛	47
2½ & 3	54	¼ & ⅜	50
3½ to 8	56	½	54½
10	55½	¾	57½
12	54½	1 to 3	59½

Boiler Tubes: Net base prices per 100 feet, fob Pittsburgh, in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	Seamless Hot Rolled	Seamless Cold Drawn	Elec. Weld Hot Rolled	Elec. Weld Cold Drawn
1"	13	....	$10.89	$10.62	$10.62
1¼"	13	....	12.90	10.59	12.58
1½"	13	$12.00	14.26	11.70	13.90
1¾"	13	13.65	16.23	13.31	15.82
2"	13	15.29	18.17	15.00	17.95
2¼"	13	17.05	20.26	16.71	20.00
2¼"	12	18.78	22.31	18.38	22.00
2½"	12	20.57	24.43	20.11	24.07
2¾"	12	21.80	25.89	21.27	25.46
3"	12	22.87	27.18	22.26	26.68
3¼"	11	26.88	31.94	26.15	31.33
3½"	11	28.86	34.30	28.06	33.64
4"	10	35.82	42.55	34.78	41.68
4½"	9	47.48	56.42	....	....
5"	9	54.96	65.30	....	....
6"	7	$4.38	100.25	....	....

Pipe, Cast Iron: Class B, 6-in. and over $65 per net ton, Birmingham; $70, Burlington, N. J.; $75.56, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length 55 off
⅝ and ¾, up to 6 in. in length ..... 52 off
⅞ x 6 in. ..... 49 off
⅞ and 1 in. x 6 in. length ..... 51 off
1⅛ in. and larger in all lengths and ⅞ in. and larger in lengths over 6 in. .. 48 off
½ in. and smaller, longer than 6 in. .. 45 off
Tire bolts .....38½ off
Step bolts ..... 46 off
Plow bolts ..... 57 off

Stove Bolts

In packages, nuts separate, 60-10 off; bulk 74 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅞-in. and smaller.....	51 off	....
1-in. and smaller.....	....	48 off
⅛-in.-1-in.	48 off	....
1⅛-in.-1-in.	....	47 off
1⅛-in.-1½-in.	46 off	45 off
1⅝-in. and larger	....	44 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in., smaller (10-20 bright).... 56 off
Upset (10-35 heat treated)
⅝ x 6 ..... 51 off
¾, ⅞, & 1 x 6 ..... 47 off

Square Head Set Screws

Upset 1-in. and smaller ..... 61 off
Headless, ¼-in. and larger ..... 46 off
No. 10 and smaller ..... 56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago Birmingham

Structural 5.25c
Lebanon, Pa. 5.40c
½-in. and under .....55-5 off
Lebanon, Pa. .....55-5 off plus 15c per cwt.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl .....$1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 16.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	...	74.00c
1.5	4	1	8.5	59.00c
12	3	0.50	...	62.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	90.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301....	26.00c	29.50c	37.00c	22.00c	28.00c
302....	26.00	29.50	37.00	23.50	30.50
303....	28.50	31.50	39.00	29.50	36.00
304....	27.50	31.50	39.00	25.50	32.50
308....	31.50	37.00	44.50	31.00	38.00
309....	39.00	43.50	51.00	40.50	51.00
310....	53.50	56.50	57.50	53.00	61.00
316....	43.50	48.00	52.00	43.50	52.00
321....	31.50	37.00	44.50	32.00	41.50
347....	36.00	41.50	49.00	36.00	45.50
431....	21.00	24.00	31.50	19.00	24.50
440A ..	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403....	23.50	27.00	32.00	23.00	29.50
410....	20.50	23.50	29.00	18.50	24.00
416....	21.00	24.00	29.50	20.00	25.50
420....	26.00	31.00	86.50	26.00	39.50
430....	21.00	24.00	31.50	19.00	24.50
430F ..	21.50	24.50	32.00	20.50	27.00
442....	24.50	28.00	35.50	26.00	35.00
443....	24.50	28.00	35.50	26.00	35.00
446....	30.00	36.00	39.50	38.00	36.50
*501...	9.00	13.00	17.50	13.00	18.50
*502...	10.00	14.50	18.50	14.50	19.50
†STAINLESS CLAD STEEL (20%)					
304....	....	24.00	22.00	....	....
410....	....	22.00	20.00	....	....
430....	....	22.50	20.50	....	....
446....	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax

Pig Iron

Prices per gross ton	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$34.50	$34.00	$35.50	$35.00
Newark, N. J., del.	36.34	35.84	37.34	36.84
Brooklyn, N. Y., del.	37.50	....	....	38.00
Birdsboro, Pa., base	34.50	34.00	35.50	35.00
Philadelphia, del.	36.02	35.52	37.02	36.52
Birmingham, base	29.88	29.38	34.50	....
Baltimore, del.	36.28	....	....	....
Chicago, del.	34.12	....	....	....
Cincinnati, del.	34.75	34.25	....	....
Newark, N. J., del.	35.96	....	....	....
Philadelphia, del.	35.13	....	....	....
St. Louis, del.	33.87	33.37	....	....
Buffalo, base	33.00	32.50	34.00	33.50
Boston, del.	39.48	38.98	40.48	39.98
Rochester, del.	34.84	34.34	35.84	35.34
Syracuse, del.	35.50	35.00	36.50	36.00
Chicago, base	33.00	32.50	34.00	33.50
Milwaukee, del.	34.32	33.82	35.32	34.83
Muskegon, Mich., del.	36.83	....	....	37.33
Cleveland, fob furnace	33.00	32.50	34.00	33.50
Akron, del.	35.17	34.17	35.67	35.17
Duluth, base	33.50	33.00	34.50	34.00
Erie, Pa., base	33.00	32.50	34.00	33.50
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.00	29.50	31.00	30.50
Granite City, Ill., base	33.50	33.00	....	33.50
St. Louis, del.	34.25	33.75	....	34.25
†**Neville Island, Pa.,** base	33.50	33.00	34.00	33.50
Pittsburgh, del., N. & S. sides	34.33	33.83	34.83	34.33
Provo, Utah, base	33.50	33.00	....	....
Seattle, Tacoma, Wash., del.	38.60	....	....	....
Portland, Oreg., Del.	38.60	....	....	....
Sharpsville, Pa., base	33.50	33.00	34.00	33.50
Steelton, Pa., base	34.50	34.00	35.50	35.00
Swedeland, Pa., base	35.50	....	36.50	36.00
Troy, N. Y., base	34.50	34.00	35.50	35.00
Toledo, O., base	33.00	32.50	34.00	33.50
Cincinnati, del.	36.50	36.00	....	....
Youngstown, O., base	33.50	33.00	34.00	33.50
Mansfield, O., del.	36.48	35.98	36.98	36.48

† To Neville Island base add: 66c for McKees Rocks, Pa.; $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Oakmont, Verona; $1.49 Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of Sharpsville, Pa., basing point price for No. 2 foundry, basic, bessemer and malleable pig iron.

High Silicon Silvery

6.00-6.50 per cent (base)	$40.50		
6.51-7.00	$41.50	9.01- 9.50	46.50
7.01-7.50	42.50	9.51-10.00	47.50
7.51-8.00	43.50	10.01-10.50	48.50
8.01-8.50	44.50	10.51-11.00	49.50
8.51-9.00	45.50	11.01-11.50	50.50

Fob Jackson, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01-14.50%, $52.75, Jackson, O.; $56 Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.... $40.50 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $33.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., Birdsboro, Pa., $39, base; Philadelphia, $41.16, del. Intermediate phosphorus, Central furnace, Cleveland, $36.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$8.75–$9.50
Connellsville, foundry	9.75–11.00
New River, foundry	12.50
Wise county, foundry	11.15
Wise county, furnace	10.65

* Operators of hand-drawn ovens using trucked coal, $9.35-$10.10.

By-Product Foundry

Kearney, N. J., ovens	$15.35
Chicago, outside del.	15.10
Chicago, del.	16.10
Terre Haute, del.	15.60
Milwaukee, ovens	15.85
New England, del.	17.25
Birmingham, del.	12.35
Indianapolis, ovens	14.50
Cincinnati, del.	15.35
Ironton, O., ovens	13.35
Painesville, ovens	14.60
Cleveland, del.	15.90
Buffalo, del.	16.10
Detroit, del.	15.75
Philadelphia, ovens	14.50
Portsmouth, O., ovens	14.00
Fairmount, W. Va., ovens	13.75
Pittsburgh, del.	15.61

Coke By-Products

Spot, gal, freight allowed east of Omaha

Pure and 90% benzol	17.00c
Toluol, two degrees	22.00c
Industrial xylol	22.00c
Solvent naphtha	26.00c

Per pound fob works

Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c

Eastern plants, per pound

Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.50c

Per ton, bulk, fob plants

Sulphate of ammonia	$30.00

Refractories

Per 1000, fob shipping point Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$87.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	70.00
Ala., Ga.	70.00
N. J.	75.00

Intermediate Heat Duty

Ohio	64.00
Pa., Ill., Md., Mo., Ky.	64.00
Ala., Ga.	56.00
N. J.	67.00

Low Heat Duty

Pa., Md., Ohio	56.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	47.00
Wire Cut	45.00

Malleable Bung Brick

All bases	80.00

Silica Brick

Pennsylvania	70.00
Joliet, E. Chicago	79.00
Birmingham, Ala.	70.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	24.00
Single bags	28.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	59.00
Chem. bonded chrome	59.00
Magnesite brick	81.00
Chem. bonded magnesite	70.00

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.95
Old range nonbessemer	5.80
Mesabi bessemer	5.70
Mesabi nonbessemer	5.55
High phosphorus	5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	15.25

Foreign Ore

Cents per unit, cif Atlantic ports

N. African low phos.	Nom.
Swedish basic, 60 to 68%	13.00
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro	7.50–8.00

Tungsten Ore

Wolframite, per short ton unit, duty paid	$24–$25

Manganese Ore

46-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 63.00c-67.00c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$27-$27.50
45% no ratio	28.00
48% no ratio	30.00
50% no ratio	31.00
Brazilian—nominal	
44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	$27-27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	3.85	3.75–3.85	...	...	...
Cold-Rolled	4.55–4.75	4.55–4.75	4.55–4.75	4.75	...	4.55–4.75	...	...	...
Galvanized	5.40	.....	.....	...	...	.....	...	...	...
Strip, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	...	.....	...	...	...
Cold-Rolled	4.55	4.65	4.65	4.65	...	.....	...	...	...
Shapes, Structural	3.85	3.85	.....	3.85	...	.....	3.85	...	...
Plates	4.10	4.10	4.10	...	4.10	.....	...	...	...
Bars and Bar Shapes	4.00	4.00	4.00	4.00	...	4.00	...	4.00	4.00

Note: Lower level of quoted ranges represent prices for NAX High Tensile, produced by Great Lakes Steel Corp., Detroit.

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	C-R	H-R	C-F	H-R Alloy (‡4140)	Structural Shapes	Carbon ⅛"-¾"	Floor ⅝" & Thicker
Boston (city)	4.50	....	5.22[4]	6.80[4]	6.80[4]	4.65	6.36	4.62	5.47	7.12	4.47	4.80	6.42
††New York (city)	4.42	....	5.27[5]	5.47[5]	....	4.62	....	4.62	5.42	8.42[13]	4.37	4.72	6.35
New York (country)	4.32	....	5.17[5]	5.37[5]	....	4.52	....	4.52	....	....	4.27	....	6.25
Philadelphia (city)	4.24	5.73[9]	5.33[9]	5.29[5]	6.54[5]	4.43	5.28	4.48	5.38	6.87	4.22	4.44	5.93
Philadelphia (country)	4.14	5.63[9]	5.23[9]	5.19[5]	6.44[5]	4.33	5.18	4.38	....	6.60	4.12	4.34	5.83
Baltimore (city)	4.09	6.15[8]	5.65[8]	5.14[5]	6.39[5]	4.40	....	4.45	5.35	....	4.34	4.39	5.90
Baltimore (country)	3.59	6.05[8]	5.55[8]	....	....	....	....	....	4.85	....	4.24	4.29	5.80
Washington (city)	4.35	....	....	5.18[5]	6.43[5]	4.65	....	4.70	5.60[11]	....	4.60	4.65	6.60
Norfolk, Va.	4.35	....	....	....	....	....	....	4.75	5.50	....	4.50	4.50	6.25
Buffalo (city)	4.00	....	4.70[6]	4.35[5]	....	4.30	4.95	4.05	4.95	....	4.05	4.60	5.90
Buffalo (country)	3.90	....	4.60[6]	4.95[5]	....	3.90	4.60	3.95	4.85	6.60	3.95	4.20	5.45
Pittsburgh (city)	4.05	5.20[8]	4.75[8]	5.10[5]	6.35[5]	4.05	5.00	4.10	4.75	6.60	4.10	4.30	5.60
Pittsburgh (country)	3.90	5.05[8]	4.60[8]	4.95[5]	6.20[5]	3.90	4.85	3.95	4.60	6.60	3.95	4.15	5.45
Youngstown, O. (city)	4.188	5.338	4.888	5.05	6.30	4.00	....	4.238	5.138	....	4.218	4.488	5.178
Youngstown, O. (country)	....	....	....	4.95	6.20	3.90	....	....	....	....	....	....	....
Detroit	4.15	5.30	4.85	5.42	6.67	4.34	5.24	4.20	4.87[13]	7.01	4.42	4.49	5.92
Cleveland (city)	4.05	5.20[8]	4.75[8]	5.238[8]	6.488[5]	4.188	5.10	4.10	4.75	6.858	4.311	4.25	5.961
Cleveland (country)	3.90	5.05[8]	4.60[8]	....	....	3.90	4.95	3.95	4.60	....	....	4.10	....
Cincinnati	4.116	5.266[8]	....	5.166[5]	....	4.394	....	4.403	5.303	....	4.444	4.453	5.944
Chicago (city)	4.05	5.20[8]	4.75[8]	5.10[5]	6.35[5]	4.05	5.10	4.10	4.75	6.60	4.10	4.25	5.75
Chicago (country)	3.90	5.05[8]	4.60[8]	4.95[5]	6.20[5]	3.90	4.95	3.95	4.60	6.60	3.95	4.10	5.60
Milwaukee	4.249	5.399[8]	4.949[8]	5.299[5]	6.549[5]	4.249	5.299	4.299	4.949	6.899	4.299	4.449	5.949
St. Paul	4.384[1]	5.534[8]	5.084[8]	5.434[5]	6.684[5]	4.404[13]	....	4.434[13]	5.726[11]	7.084[11]	4.434[13]	4.684[13]	6.084[13]
Indianapolis	4.04	....	4.84[5]	5.29[5]	6.54[5]	4.24	....	4.361‡‡	5.26	....	4.36	4.61	6.01
St. Louis	4.199	....	4.899[9]	....	6.674[5]	4.199	....	4.249	5.324[13]	7.074	3.999	3.999	5.999
Birmingham (city)	3.85[20]	....	....	5.20[5]	....	4.10[20]	....	4.05[20]	5.83	....	4.05	4.30	6.56
Birmingham (country)	3.75[20]	....	....	5.20[5]	....	4.00[20]	....	3.95[20]	....	....	3.95	4.20	....
New Orleans	4.46**	....	5.77[8]	....	....	4.83[20]	....	4.78**	6.14[11]	....	4.68**	4.83[26]	6.94[26]
Houston, Tex.	5.00[1]	....	....	6.00	....	6.00[1]	....	5.35[1]	....	6.35	5.85	5.85	6.40
Omaha, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[13]	....	4.918	5.068	6.568
Los Angeles	5.55	....	7.10[5]	....	8.10[5]	5.65	8.35	5.10	6.90[10]	7.85	5.20	5.20	7.20
San Francisco	4.90§§	....	6.30[5]	....	7.35[5]	5.20[14]	8.35[14]	4.75[14]	•••	9.35[16]	4.90[14]	5.00[24]	6.80[14]
Tacoma, Wash.	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[10]	8.95[10]	4.95[17]	5.25[17]	7.25[17]
Seattle	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[10]	8.95[10]	4.95[17]	5.25[17]	7.25[17]

Base Quantities: 400 to 1999 pounds except as noted: Cold-rolled strip, 2000 to 39,999 pounds; cold finished bars, 1000 pounds and over; [1]—any quantity; [2]—300 to 1999 pounds; [3]—150 to 2249 pounds; [4]—three to 24 bundles; [5]—450 to 1499 pounds; [6]—one bundle to 1499 pounds; [7]—one to nine bundles; [8]—400 to 1499 pounds; [9]—1000 to 1999 pounds; [10]—450 to 39,999 pounds; [11]—1000 to 39,999 pounds; [12]—1000 pounds and over; [13]—400 to 14,999 pounds; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 49,999; [17]—300 to 9999 pounds; [18]—1500 to 1999 pounds; [19]—1500 to 39,999; [20]—400 to 3999 pounds.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ basing point cities with quotations representing mill prices plus warehouse spread; § as rolled, except New York, Jersey City, Indianapolis and San Francisco where price represents annealed bars; ** add 0.46 for sizes not rolled in Birmingham; †† sameprices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier; *** rounds under ⅜ in. 7.00c, ⅜ in. and over 6.50c, squares, hexagons and flats 6 in. and narrower 7.50c, flats over 6 in. 8.25c at San Francisco.

PRICES OF LEADING FERROALLOYS PRODUCTS

Spiegeleisen: 19-21% Mn, 1-3% Si, carlot per gross ton, Palmerton, Pa., $44; Pittsburgh, $48. 16% to 19% Mn, Pittsburgh, $47.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140.25 fob cars, Pittsburgh, including 75c switching charge, (where Carnegie - Illinois Steel Corp. is producer); add $8 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.30c; regular, 21.20c; medium, 15.20c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) Prices per lb of briquets: Contract, bulk, carlots, 7.00c, packed, carlots, 7.60c, ton lots, 8.00c, smaller lots 8.40c, eastern, freight allowed; 7.25c, 7.85c, 8.60c and 9.00c, central; 7.80c, 8.40c, 10.50c and 10.90c, western; spot up 0.25c; notched, up 0.25c.

Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, $2.10; contract, $2.08; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; smaller lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum C; per lb contained Ti; ton lots $1.35; smaller lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

Ferrovanadium: V 0.35-0.55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 13.80c, ton lots 14.30c, smaller lots 14.80c; 75%, c.l. 11.05c, ton lots 11.65c, smaller lots 12.25c; 50%, c.l. 9.00c, ton lots 9.65c, smaller lots 10.30c. Deduct 1.00c for bulk, carlots, 80-90% and 90-95%; 1.05c, 75%; 1.20c, 50%. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, smaller lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; smaller lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots. **High carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c. **Low carbon,** eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22.00c, 0.2% 21.75c; 0.5% 21.50c, 1% 21.00c, 2% 20.50c; add 1.35c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l.; and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carlot packed differential 0.80c. Prices are per lb of contained Cr, freight allowed.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, smaller lots 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots. **S. M. Ferrochrome, high carbon:** (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, smaller lots 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium, spot prices 0.25c higher. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 21.00c; packed carlot 21.80c, ton lots 22.35c, smaller lots 23.35c, eastern, freight allowed, per pound of contained Cr; 21.40c, 22.20c, 23.00c, and 24.00c, central; 21.50c, 22.30c, 24.20c and 25.20c, western spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, smaller lots 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; spot prices 0.25c higher; notched, 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb to c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb. $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, packed, 16.10c, ton lots 17.60c, smaller lots 18.60c, eastern, freight

allowed; 16.60c, 18.45c, 19.45c, central; 18.65c, 20.20c, 21.20c, western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, lump, packed, carlots 14.60c, ton lots 16.10c, smaller lots 17.10c, eastern, freight allowed; 15.10c, 16.85c, 17.85c, central; 17.15c, 19.00c, 20.00c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 14.50c; 2000 lb to c.l. 16.00c; central zone, 15.10c and 18.25c; western, 15.70c and 20.00c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l. 14.10c; 2000 lb to c.l. 15.60c; central 14.70c and 17.85c; western, 15.30c and 19.60c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese Briquets: Containing exactly 2 lb Mn and about ½ lb Si, eastern zone, bulk, c.l. 6.75c, ton lots 7.75c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Silicon Briquets: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.70c, ton lots 5.10c, smaller lots 5.50c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.85c, ton lots 5.25c, smaller lots 5.65c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max, Ni, balance). Prices per lb of alloy: Contract, 5 tons or more $1.90, 1 ton to 5 tons $2.00, smaller lots $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, smaller lots 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Prices per lb of alloy, contract, carlots 13.50c, ton lots 14.25c, smaller lots 15.00c, eastern zone, freight allowed; 13.80, 15.35c, 16.10c, central; 13.80c, 17.30c, 18.05c, western; spot up 0.25c.

CMSZ Alloys 4 & 5 (Alloy 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3.00-4.50%; alloy 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%). Prices per lb of alloy, contract or spot, bulk, carlots 14.50c; packed, carlots 15.25c, ton lots 16.00c, smaller lots 16.75c, eastern, freight allowed; 14.80c, 15.55c, 17.10c, 17.85c, central; 14.80, 15.55c, 19.05c, 19.80c, western.

Zirconium alloy: 12-15%, per lb of alloy, eastern, contract, bulk, carlots 5.50c, packed, carlots 6.05c, ton lots 6.40c, smaller lots 6.75c; spot up 0.25c.

Zirconium alloy: Zr 35-40%, eastern, contract, packed, carlots 17.00c, ton lots 17.75c, smaller lots 19.00c; spot up 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb 6.25c; ton lots 6.75c; smaller lots 7.25c. Spot up ½c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, smaller lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 98.8%, $2.80, freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% Na_2O; or air dried, 83-85% V_2O_5 and 5.15% Na_2O, $1.10 per lb contained V_2O_5 fob plant freight allowed on quantities of 25 lb and over to St. Louis.

Nonferrous Metals Remain Quiet

Texas City disaster may disrupt tin smelter operations . . . Copper statistics for March favorable

New York — Activity in nonferrous metal markets was quiet last week and no price changes were made in major metals, although mercury eased slightly to $85 per flask for large lots and a range of $86 to $88 for smaller lots, delivered New York. Present high prices are stimulating lead and zinc mining operations but will have little effect on availability of copper and tin over the balance of this year.

To help relieve shortages, about $33 million worth (estimated cost) of strategic materials, such as copper, lead, tin and zinc, have been channeled into industry by War Assets Administration during the past year. In a report on some 40 kinds of materials for the period Mar. 26, 1946, to Mar. 7, 1947, WAA said that a cumulative total of $26,163,133 worth of strategic materials was sold through WAA offices and $6,407,895 worth turned over to Reconstruction Finance Corp. to be allotted by the Civilian Production Administration. An estimated 188,369,749 pounds of copper which cost about $19,443,238, were returned to civilian use through WAA offices and 13,500,093 pounds, costing $1,622,548, were turned over to RFC for release by CPA.

COPPER — Unexpected increases in copper production and deliveries were reported by the Copper Institute in its March report. Output of crude copper rose about 10,000 tons to 84,270 tons, of which 75,332 tons were primary output and 8938 tons from secondary sources. The March total was the largest recorded since July, 1944, when production was 86,224 tons. Production at refineries also rose sharply, about 11,000 tons, to a total of 88,131 tons, the highest recorded since October, 1944, when the total was 89,068 tons.

Deliveries of refined copper to consumers increased 5856 tons to a total of 123,590 tons, of which 93,049 tons were domestic copper and 30,541 tons were foreign copper supplied by the Office of Metals Reserve.

Deliveries of domestic copper were 4918 tons in excess of refinery output, resulting in a reduction in stocks at refineries to a total of 69,727 tons, the smallest since April of last year when 65,448 tons were held. Blister copper stocks were cut 3861 tons, making a decrease of 8779 tons in all stocks.

Buyers marked time last week, pending final congressional action on the copper tax suspension bill. Many market observers were of the opinion that the domestic copper price will advance to the foreign market level as soon as the import tax is removed. The foreign market last week was about 2.25 cents above the 21.50-cent level which prevailed here.

LEAD—Despite the highest rate of lead production that has been attained since 1945, no lead is available for delivery this month and leading sellers are rapidly filling May books. Prices held unchanged last week on the St. Louis basis of 14.80c to 14.85c for common grade, 14.90c for chemical and corroding grades.

Zinc — With production of zinc about in balance with demand, buying interest here continues quiet. An inquiry from India for about 2500 tons of prime western, calling for May, June and July shipments, had not been reported up to late last week. Most sellers do not have a surplus above requirements of their domestic customers and, therefore, have shown little interest in the inquiry which has been out since early in the month. Prime western is quoted at about 11.00c, fas Gulf ports, and 10.50c, East St. Louis.

Tin — Catastrophic explosions and fire which swept Texas City, Tex., last week probably will disrupt, if not halt, production at the government-owned tin smelter in that city, although extent of damage to that property was unreported at the time this was written. The Longhorn tin smelter, located about two miles north of the Monsanto plant, produced 3024 tons of tin in January and 3209 tons in December, and has accounted for practically all of new supplies available to consumers in this country. One steel mill reports, however, that his April allotment is coming from a New York warehouse for the first time in many months. Origin of this tin was Japan. Straits tin held unchanged last week at 80.00c, New York.

ALUMINUM — In terms of volume shipped, aluminum has moved into second place among the metals, being exceeded only by iron and steel, Arthur V. Davis, chairman, Aluminum Co. of America, reports. Heavy demand for aluminum is attributed to the fact that basic aluminum prices have been reduced by 30 per cent in recent years and are relatively lower than ever before in the face of general price advances for competitive metals; increased familiarity of thousands of workers and many manufacturers with the handling of aluminum as a result of war work. Demand for aluminum has exceeded supply since the end of the war, contrary to expectations.

Shipments of aluminum by the company in 1946 were distributed by industries as follows: Transportation, 14 per cent; power transmission, 5 per cent; cooking utensils, 11 per cent; household appliances, 6 per cent; building products, 18 per cent; fabricators for processing, 25 per cent; machinery, 6 per cent; all other uses 15 per cent.

The price holds unchanged on the basis of 15.00c, delivered for 99 per cent plus ingots.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 21.50c, del. Conn.; Lake, 21.62½c, del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 21.25c, refinery, 20,000 lb or more; 21.50, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 21.50c; 88-10-2 (No. 215) 27.25c; 80-10-10 (No. 305) 25.25c; No. 1 yellow (No. 405) 17.00c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Prime western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 15.50c; No. 12 foundry alloy (No. 2 grade) 15.00c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 16.00c; grade 2 (92-95%) 15.00c; grade 3 (90-92%) 14.25c; grade 4 (85-90%) 13.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlot; 22.50c 100 lb to c.l. Extruded 12-in. sticks 34.00c-38.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 80.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 79.85c; Grade C, 99.65-99.79% incl. 79.55c; Grade D, 99.50-99.64% incl., 79.40c; Grade E, 99-99.49% incl. 78.90c; Grade F, below 99% (for tin content), 78.70c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 33.00c, 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 33.50c, effective as of Mar. 15. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; add 2c for 223 lb and less; on sales by dealers, distributors, and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $85-$88 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.80.

Cobalt: 97-98%, $1.50 lb for 550 lb (keg); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y., 76.00c per ounce.

Platinum: $62-$66 per ounce.

Palladium: $24 per troy ounce.

Iridium: $85-$95 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 21.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 32.93c; yellow brass 28.88c; commercial bronze, 95% 32.97c, 90% 32.36c red brass, 85% 31.24c, 80% 30.63c; best quality 29.89c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 37.71c; nickel silver, 18%, 41.54c; phosphor bronze, grade A, 5%, 50.75c.

Rods: Copper, hot rolled 29.28c, cold drawn 30.28c; yellow brass, free cutting, 23.64c, not free cutting 28.57c; commercial bronze, 95% 32.66c, 90% 32.05c; red brass, 85% 30.93c, 80% 30.32c; best quality 29.58c.

Seamless Tubing: Copper 32.97c; yellow brass 31.64c; commercial bronze 90% 34.77c; red brass 85% 33.90c, 80% 33.29c; best quality brass 32.30c.

Copper Wire: Bare, soft, fob eastern mills, carlots 27.72c, less carlots 28.22c; weatherproof, fob eastern mills carlots 28.12c, less carlots 28.62c; magnet, delivered, carlots 31.13c, 15,000 lb or more 31.38c, less carlots 31.88c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers: Sheets, full rolls, 140 sq ft or more, 18.25c; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft and circles.
Pipe: Full coils 17.50c; cut coils 17.75c.
Lead Traps and Bends: List plus 42%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.50c; over 12-in., 14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, fob Philadelphia, carloads, 21.00c; 5 tons and over, 21.50c; 1 to 5 tons, 22.00c; less than 1 ton, 22.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 29.84c; oval, 29.34c; electro-deposited, 29.09c; cast, 28.84c.

Copper Carbonate: 52-54% metallic Cu, 50 lb bags, 26.50c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c fob Cleveland.

Sodium Cyanide: 96-98%, ½-oz balls, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 30,000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 20.00c.

Tin Anodes: Bar, 1000 lb and over 92.50c; 500 to 1000 lb, 93.00c; 200 to 500 lb, 93.50c; less than 200 lb, 94.00c; ball, 1000 lb and over, 94.75c, 500 to 1000 lb, 95.25c, 200 to 500 lb, 95.75c; less than 200 lb, 96.25c, fob Sewaren, N. J.

Tin Chloride: Fob Grasselli, N. J., 625 lb bbls., 60.00c; 100 lb kegs, 60.50c.

Sodium Stannate: To all consumers: in 200 or 500 lb drums, 49.50c; 100 lb, 50.50c; 50 lb, 55.00c; 25 lb, 57.00c.
To consumers other than automobile, radio and refrigerator makers: 1500 lb, 45.85c; 600 to 1400 lb, 48.50c.
To automobile, radio and refrigerator makers: 10,000 lb and over, 44.50c; 2000 to 9999 lb, 45.50c; 1000 to 1999, 46.50c; 600 to 9999 lb, 48.50c.

Zinc Cyanide: 100-lb drums 36.00c, fob Cleveland; 35.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

Prices for less than 15,000 lb fob shipping point. Add ⅝c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.125	14.875	14.250
Commercial Bronze			
95%	18.000	17.750	17.250
90%	17.500	17.250	16.750
Red brass			
85%	17.250	17.000	16.500
80%	16.875	16.625	16.125
Best Quality (71-79%)	16.125	15.875	15.375
Muntz Metal	14.125	13.875	13.375
Nickel silver, 5%	16.125	15.875	8.063
Phos. bronze, A. B.	20.000	19.750	18.750
Naval brass	14.500	14.250	13.750
Manganese bronze	14.500	14.250	13.625

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 18.00c, No. 2 copper 17.00, light copper 16.00, composition red brass 16.75, auto radiators 13.25, heavy yellow brass 12.00, brass pipe 12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper, 19.50; No. 2 copper, 18.50, light copper 17.50; refinery brass (60% copper), per dry copper content less $5 smelting charge for brass analyzing 60 per cent or more, 17.62½c.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 16.50-17.00; No. 2 15.50-16.00; light copper 14.25-14.75; No. 1 composition red brass 14.25-14.50, No. 1 composition turnings 14.00-14.25, mixed brass turnings 9.75-10.00, new brass clippings 12.50-13.00, No. 1 brass rod turnings 11.75-12.25, light brass 8.50-9.00, heavy yellow brass 9.75-10.00, new brass rod ends 12.00-12.50, auto radiators, unsweated 11.50-12.00, clean red car boxes 12.50-13.00, cocks and faucets 11.25-11.50, brass pipe 11.00-11.50.

Lead: Heavy lead 12.50, battery plates 7.50-7.75, linotype and stereotype 13.50-14.00, electrotype 11.50-12.00, mixed babbitt 13.50-14.00, solder joints 15.50-16.00.

Zinc: Old zinc 5.50-6.00, new die cast scrap 4.50-5.00, old die cast scrap 3.50-4.00.

Tin: No. 1 pewter 50.00-52.00, block tin pipe 67.00-68.00, auto babbitt 40.00-42.00, No. 1 babbitt 40.00-43.00, siphon tops 40.00-42.00.

Aluminum: Clippings, 2S, 9.00-9.50, old sheets 7.00-7.50, crankcase 7.00-7.50, borings and turnings 3.00, pistons, free of struts, 6.75-7.00.

Nickel: Anodes 19.50-20.50, turnings 16.50-17.50, rod ends 19.00-20.00.

Monel: Clippings 14.00-15.00, turnings 9.00, old sheet 12.00-13.00, rods 12.50-13.00, castings 10.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

Prices for open hearth grades from remote points range from $35 to $37; on electric furnace grades, $41 to $42, depending on freight. Prices for all steelmaking grades, both for local and remote material, temporarily nominal and based on offering quotations.

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Busheling	35.00
Nos. 1, 2 & 3 Bundles.	35.00
Machine Shop Turnings	27.75-28.75
Mixed Borings, Turnings	28.50-29.50
Short Shovel Turnings.	29.75-30.25
Cast Iron Borings	29.00-30.00
Bar Crops and Plate	41.00-42.00
Low Phos. Cast Steel	40.00-41.00
Punchings & Plate Scrap	41.00-42.00
Elec. Furnace Bundles.	41.00-42.00
Heavy Turnings	34.00-34.50
Alloy Free Turnings	30.50-31.00
Cut Structurals	41.00-42.00
No. 1 Chemical Borings	31.00-32.00

Cast Iron Grades

No. 1 Cupola	43.50-44.50
Charging Box Cast	39.00-39.50
Heavy Breakable Cast.	40.00-40.50
Stove Plate	38.00-38.50
Unstripped Motor Blocks	42.00-43.00
Malleable	46.00-47.00
Brake Shoes	35.00-36.00
Clean Auto Cast	43.50-44.50
No. 1 Wheels	45.00-46.00
Burnt Cast	35.00-36.00

Railroad Scrap

No. 1 R.R Heavy Melt.	38.00
R.R. Malleable	48.00-49.00
Axles	44.00-45.00
Rails, Rerolling	41.00-42.00
Rails, Random Lengths	38.00-39.00
Rails, 3 ft and under	42.00-43.00
Rails, 18 in. and under.	43.50-44.00
Railroad Specialties	42.00-43.00
Uncut Tires	39.00-41.00
Angles, Splice Bars	41.00-42.00

CLEVELAND

No. 1 Heavy Melt. Steel	$34.50-35.00
No. 2 Heavy Melt. Steel	34.50-35.00
No. 1 Busheling	34.50-35.00
Nos. 1 & 2 Bundles	34.50-35.00
Machine Shop Turnings	28.50-29.00
Mixed Borings, Turnings	28.50-29.00
Short Shovel Turnings.	30.00-30.50
Cast Iron Borings	30.00-30.50
Bar Crops and Plate	37.00-37.50
Cast Steel	37.00-37.50
Punchings & Plate Scrap	37.00-37.50
Elec. Furnace Bundles.	35.50-36.00
Heavy Turnings	34.00-34.50
Alloy Free Turnings	30.00-30.50
Cut Structurals	40.00-45.00

Cast Iron Grades

No. 1 Cupola	45.00-48.00
Charging Box Cast	42.00
Stove Plate	44.00
Heavy Breakable Cast.	42.00-44.00
Unstripped Motor Blocks	40.00-44.00
Malleable	57.00-58.00
Brake Shoes	43.00
Clean Auto Cast	48.00
No. 1 Wheels	43.00
Burnt Cast	42.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	37.50-38.00
R.R. Malleable	57.00-58.00
Rails, Rerolling	46.00-48.00
Rails, Random Lengths	45.00-48.00
Rails, 3 ft and under	48.00
Railroad Specialties	45.00
Uncut Tires	44.00
Angles, Splice Bars	46.50-47.50

VALLEY

No. 1 Heavy Melt. Steel	$35.00-35.50
No. 2 Heavy Melt. Steel	35.00-35.50
No. 1 Bundles	35.00-35.50
Machine Shop Turnings	29.00-29.50
Short Shovel Turnings.	30.50-31.00
Cast Iron Borings	30.50-31.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00

MANSFIELD

No. 1 Heavy Melt. Steel	$35.00-35.50
Machine Shop Turnings	29.00-29.50
Short Shovel Turnings.	30.50-31.00

CINCINNATI

No. 1 Heavy Melt. Steel	$33.00
No. 2 Heavy Melt. Steel	33.00
No. 1 Busheling	33.00
No. 1 Bundles	33.00
No. 2 Bundles	33.00
Machine Shop Turnings.	26.00
Mixed Borings, Turnings	24.00
Short Shovel Turnings.	27.00
Cast Iron Borings	27.00

Cast Iron Grades

No. 1 Cupola Cast	42.00
Charging Box Cast	35.00
Heavy Breakable Cast.	37.00
Stove Plate	33.00
Unstripped Motor Blocks	34.00
Brake Shoes	32.00
Clean Auto Cast	40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	36.00
R.R. Malleable	46.00
Rails, Rerolling	39.00
Rails, Random Lengths	39.00
Rails, 18 in. and under.	46.00

DETROIT

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$30.50-31.00
No. 1 Busheling	30.50-31.00
Nos. 1 & 2 Bundles	30.50-31.00
No. 3 Bundles	30.50-31.00
Machine Shop Turnings	24.50-25.00
Mixed Borings, Turnings	24.50-25.00
Short Shovel Turnings.	25.50-26.00
Cast Iron Borings	25.50-26.00
Punchings & Plate Scrap	35.00-35.50

Cast Iron Grades

No. 1 Cupola Cast	38.00-40.00
Heavy Breakable Cast.	30.00-31.00
Clean Auto Cast	38.00-40.00

BUFFALO

No. 1 Heavy Melt. Steel	$33.00-35.00
No. 2 Heavy Melt. Steel	33.00-35.00
No. 1 Busheling	33.00-35.00
Nos. 1 & 2 Bundles	33.00-35.00
Machine Shop Turnings	23.00-24.00
Mixed Borings, Turnings	23.00-24.00
Short Shovel Turnings.	25.00-26.00
Cast Iron Borings	22.00-23.00
Punchings & Plate Scrap	32.00-34.00
Elec. Furnace Bundles.	36.00-37.00
Alloy Free Turnings	29.00-30.00

Cast Iron Grades

Charging Box Cast	38.00-39.00
Heavy Breakable Cast	37.00-38.00
Stove Plate	43.00-44.00
Malleable	40.00-41.00
Clean Auto Cast	38.00-39.00
No. 1 Wheels	38.00-39.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$33.00-34.00
No. 2 Heavy Melt. Steel	33.00-34.00
No. 1 Busheling	33.00-34.00
No. 1 Bundles	33.00-34.00
No. 2 Bundles	33.00-34.00
No. 3 Bundles	31.00-32.00
Machine Shop Turnings	24.00
Mixed Borings, Turnings	22.00-23.00
Short Shovel Turnings.	24.00-25.00
Bar Crops and Plate	36.50-37.50
Punchings & Plate Scrap	36.50-37.50
Elec. Furnace Bundles.	34.50-35.50
Heavy Turnings	33.00-34.00
Cut Structurals	36.50-37.50
No. 1 Chemical Borings	31.50-32.00

Cast Iron Grades

No. 1 Cupola Cast	47.00-49.00
Charging Box Cast	44.00-45.00
Heavy Breakable Cast.	44.00-44.50
Unstripped Motor Blocks	44.00-44.50
Malleable	48.00-49.00
Clean Auto Cast	47.00-49.00
No. 1 Wheels	46.00-48.00

NEW YORK

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$31.00-31.50
No. 2 Heavy Melt. Steel	31.00-31.50
No. 1 Busheling	31.00-31.50
Nos. 1 & 2 Bundles	31.00-31.50
No. 3 Bundles	29.00-29.50
Machine Shop Turnings	20.00-21.00
Mixed Borings, Turnings	20.00-21.00
Short Shovel Turnings.	22.00-22.50
Punchings & Plate Scrap	32.00-33.00
Elec. Furnace Bundles.	32.00-32.50
Cut Structurals	32.00-33.00
No. 1 Chemical Borings	24.00

Cast Iron Grades

No. 1 Cupola Cast	41.00-42.00
Charging Box Cast	39.00-39.75
Unstripped Motor Blocks	41.00-42.00
Malleable	48.00-49.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$28.00-29.00
No. 2 Heavy Melt. Steel	28.00-29.00
No. 1 Busheling	26.00-28.00
Nos. 1 & 2 Bundles	28.00-29.00
Machine Shop Turnings	20.00-21.50
Mixed Borings, Turnings	19.00-20.00
Short Shovel Turnings.	22.00-23.00
Bar Crops and Plate	31.00-32.00
Punchings & Plate Scrap	31.00-32.00
Chemical Borings	22.00-23.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-45.00
Charging Box Cast	40.00-42.00
Heavy Breakable Cast.	42.00-44.00
Stove Plate	39.00-40.00
Unstripped Motor Blocks	37.50-39.50
Clean Auto Cast	44.00-46.00

CHICAGO

Prices for open hearth, electric furnace and foundry grades from remote points range several dollars per ton higher, depending on freight charges.

No. 1 Heavy Melt. Steel	$33.00-33.50
No. 2 Heavy Melt. Steel	33.00-33.50
Nos. 1 & 2 Bundles	33.00-33.50
No. 3 Bundles	31.00-31.50
Machine Shop Turnings	27.50-28.50
Mixed Borings, Turnings	27.50-28.50
Short Shovel Turnings.	29.50-30.50
Cast Iron Borings	28.50-29.50
Bar Crops and Plate	35.50-36.00
Cast Steel	35.50-36.00
Punchings	35.50-36.00
Elec. Furnace Bundles.	34.00-34.50
Heavy Turnings	32.50-33.00
Cut Structurals	35.00-35.50

Cast Iron Grades

No. 1 Cupola Cast	40.00-45.00
Malleable	40.00-45.00
Clean Auto Cast	40.00-45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	34.00-34.50
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	37.00-38.00
Rails, 3 ft. and under	41.00-42.00
Rails, 18 in. and under	42.00-43.00
Railroad Specialties	39.00-40.00
Angles, Splice Bars	39.00-40.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$31.50-32.50
No. 2 Heavy Melt. Steel	31.50-32.50
Machine Shop Turnings	26.50-27.50
Short Shovel Turnings.	28.50-29.50

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	40.00-42.00
Charging Box Cast	35.00-36.00
Heavy Breakable Cast.	30.00-33.00
Stove Plate	34.00-36.00
Brake Shoes	33.00-35.00
Clean Auto Cast	40.00-42.00
No. 1 Wheels	34.00-36.00
Burnt Cast	30.00-33.00

Railroad Scrap

R.R. Malleable	40.00-45.00
Rails, Rerolling	36.00-38.00
Rails, Random Lengths	34.00-36.00
Rails, 3 ft and under	38.00-40.00
Uncut Tires	34.00-36.00
Angles, Splice Bars	35.00-37.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$33.00
No. 2 Heavy Melt. Steel	33.00
No. 1 Busheling	33.00
Nos. 1 & 2 Bundles	33.00
Long Turnings	23.00
Short Shovel Turnings.	25.00
Cast Iron Borings	24.00
Bar Crops and Plate	36.00-37.00
Punchings & Plate Scrap	36.00-37.00
Cut Structurals	36.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	39.00-40.00
Stove Plate	37.00-38.00
No. 1 Wheels	33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	29.50-30.00
R.R. Malleable	37.50-38.00
Axles, Steel	33.00
Rails, Rerolling	36.00-37.00
Rails, Random Length.	33.00-34.00
Rails, 3 ft and under	36.00-37.00
Angles and Splice Bars	37.00-38.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$19.04
No. 2 Heavy Melt. Steel	*19.04
No. 1 Busheling	*19.04
Nos. 1 & 2 Bundles	*19.04
No. 3 Bundles	*17.04
Machine Shop Turnings	*12.54
Bar Crops and Plate	18.00
Cast Steel	18.00
Alloy Free Turnings	8.00
Cut Structurals	20.00-20.50
Tin Can Bundles	17.00

Railroad Scrap

Axles	26.50
Rails, Random Lengths.	21.00
Uncut Tires	28.00

* Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Busheling	20.00
Nos. 1 & 2 Bundles	20.00
No. 3 Bundles	18.00
Machine Shop Turnings	11.50
Mixed Borings, Turnings	11.50
Punchings & Plate Scrap	21.50
Cut Structurals	21.50

Cast Iron Grades

No. 1 Cupola Cast	27.50
Charging Box Cast	22.50
Heavy Breakable Cast.	21.50
Stove Plate	25.50
Unstripped Motor Blocks	21.50
Malleable	27.50
Brake Shoes	27.50
Clean Auto Cast	27.50
No. 1 Wheels	24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Railroad Malleable	27.50
Rails, Random Lengths	20.00
Angles and Splice Bars	21.50

LOS ANGELES

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
Nos. 1 & 2 Bundles	19.50
Machine Shop Turnings.	14.50
Mixed Borings, Turnings	14.50
Punchings & Plate Scrap	27.50
Elec. Furnace Bundles.	27.00

Cast Iron Grades

No. 1 Cupola Cast	30.00

Sheets, Strip . . .

Bethlehem Steel limits coverage of Sparrows Point price on hot rolled

Sheet Prices, Page 144

New York—The Sparrows Point producer has limited its basing point prices on hot-rolled sheets to 60 in. and narrower of the grades, gages and finishes produced at that plant.

Locally the sheet situation shows little change, with demand still well in excess of supply on all grades, except stainless. At present, requirements for stainless are about in balance with production, with deliveries available within two months in most cases.

While railroad equipment allocations represent a new factor, carbon sheet quotas of consumers other than railroad equipment builders in the current quarter will be about the same as in the last three-month period, assuming a high rate of uninterrupted production, which some of the mills didn't have in the first quarter because of shortages of gas, pig iron and scrap.

Philadelphia — All grades of sheets, except stainless, are in strong demand. Stainless sheet is available for delivery within two months. At least one mill, which until recently has been confining sales almost entirely to nickel-chrome grades, is now actively soliciting orders for straight chrome grades. One factor accounting for the sluggish demand for stainless sheets is the inability of consumers to get carbon sheets in quantities required for assemblies involving stainless. The Sparrows Point producer has limited his base prices at that point on hot-rolled sheets to widths 60 inches and narrower and on high-tensile low alloy sheets to widths 48 inches and narrower.

Boston—Consumers of narrow cold rolled strip are confronted with a range of prices, depending on whether or not the supplier is adopting the new carbon classifications; some producers have not, notably those doing tempering, affecting especially the high carbon product or the 0.80-1.00 carbon range. New buying has slackened slightly with some easing in pressure and scattered cancellations or deferments. One district producer is now accepting fourth quarter orders after concentrating on delinquent tonnage piled up by a strike last year. Consumer demand for some products fabricated of strip has declined which in turn is affecting steel estimates mildly. Nevertheless, there is little easing in the over-all demand and deferments are not general. Typewriter, stamping and tableware requirements are high; one typewriter plant, Royal at Hartford, is on 24-hour schedule. Tableware demand has been large for stainless, but is off moderately. Producers have in some cases reduced stainless backlogs. Pressure for sheet deliveries holds, including tack plate with but slight improvement in distribution of the latter grade. Worcester Pressed Steel Co., Worcester, has a contract for oil pans from Kaiser-Frazer taking more than 1175 tons, low carbon sheets.

Cleveland — Demand for flat-rolled carbon steel will remain heavy and in excess of supply throughout the balance of this year and probably well into the summer of 1948, according to leading producers in this district. Although sellers generally have been booking orders only from regular customers for many months, "newcomers" are more persistent than ever in attempting to place orders and establish long-term supply agreements. Activity of these potential customers has stepped up this month because many of them were cut off completely from their former sources of supply on Apr. 1. New owners of several hand mills had agreed at the time of purchase last year to fulfill contracts through the first quarter of this year, after which time they would withdraw from the open market. The plight of these "displaced" steel buyers is serious since leading producers are unable to cover their needs, amounting generally to 1000 tons or so per month.

Cincinnati—Sheet production is being maintained at capacity, although output of steel is temporarily lower, on need for repairs partly inspired by desire to conserve materials in which supplies were recently in jeopardy. Coal reserves proved adequate to bridge the period of low mine production. Pressure for deliveries is undiminished.

Chicago — Steelmaking operations in this district suffered no curtailment from the recent miners' memorial holiday, but plants are unable to make headway on reducing backlogs. Demands for all grades of sheets and strip continue strong, but consumers are bound to suffer during the balance of the year from impact of the freight car building program, one maker already having cut back quotas 15 per cent for this reason. One important sheetmaker is opening its books for last half of the year.

Pittsburgh — Galvanized sheet sellers have revised their method of pricing on specifications for heavier than regular commercial coatings. The ordered heavy coating extras, subject to close control and testing, for "F" classification (1.25 to 1.49 ounce per square foot) have been eliminated. For specifications falling within this range producers now are using the commercial coating extra plus 10 cents per 100 pounds for coating control and testing. Under the former pricing method the customer was able to obtain a 24 gage heavy coated galvanized sheet within the "F" classification for about 20 cents per 100 pounds less than regular commercial coating specification.

Sheets and strip are expected to be the last of the steel products to experience any retrenchment in demand. Despite the scheduled substantial expansion in cold-reduction rolling mill facilities this year, most sellers do not anticipate any significant easing in pressure for prompt deliveries until late fourth quarter at earliest. Supply of stainless sheets is the only item which shows signs of soon becoming in balance with demand. Consumers' inventories, except in isolated instances, are well below requirements in relation to their present operating schedules.

St. Louis — Pressure for sheets continues unabated, particularly on cold-rolled. Production is making some inroads on backlogs but mills' 1947 order books remain closed. Prospects are that priority schedules— light sheets for housing and export tin plate—may be cleaned up by June or July. Cold-rolled sheet output will drop by half, however, when Granite City Steel Co. shuts down 3500 tons of its 7000 tons monthly cold finishing capacity for installation of new cold-rolling equipment. This will begin late next month and continue for 60 days.

Steel Bars . . .

Demand-supply balance may be reached by late in third quarter

Bar Prices, Page 144

Boston—Of the major carbon products, plates, shapes and bars included, balance in supply is expected first in bars. Stringency in small sizes will continue through this quarter with some easing in the third. Improvement in cold-finished is gradually filtering down to smaller sizes, to one-half inch now, although in hot-rolled the size level is slightly higher. Demand is less urgent and cancellations or deferments on old tonnage are cropping out; two involve 3-inch and 2¼-inch rounds. At least one forge shop has experienced deferments in automobile parts, although on the whole forging plants continue at a high level of production. Users of alloy bars have no difficulty in supply; some have taken in more alloy stock than required to get a compensating volume of carbon in sizes wanted.

New York—While some producers of hot carbon bars see little easing in demand, apart from the larger sizes, others report softening in the medium sizes as well as the larger. Few, however, expect to see production and demand within reasonable balance before late in the third quarter and some doubt that even then this will apply to the small sizes. Cold-drawn carbon bars in general are in easier position than the hot-rolled material. Most consumers are now able to get large and medium size bars in desired quantities for shipment this quarter. There is still quite a squeeze with regard to the small specifications, but sellers of cold-drawn bars are more concerned about the outlook in these small sizes than they were. Few sellers are now not accepting orders on all sizes of cold-drawn bars for delivery over the remainder of this year where tonnages are available.

Pittsburgh—Producers of carbon steel bars report a definite easing in demand for 4, 5 and 6-inch rounds from forgers, machine tool builders and jobbing trade, with deliveries now available within two months. However, no let-up in requirements for merchant bars in smaller size ranges has yet developed or is indicated until late third quarter at the earliest, and present output continues under strict allocation. The augmented railroad freight construction program has accentuated the tight supply outlook. No additional revision in extras on merchant bars is indicated. New extras for packaging and ordering to dead lengths have resulted in many consumers revising specifications to avoid these extras whereever possible. Demand for cold-drawn bars within the smaller size classifications has recorded little change, although some consumers are watching inventories more closely than six months ago. Cold-finishers are operating at near capacity levels, reflecting return of adequate industrial gas supply and relatively heavy volume of mill shipments in recent months. Demand-supply situation in hot-rolled alloy bars continues in good balance with most mills able to promise delivery within four to six weeks.

Philadelphia—While still in active demand, hot-rolled carbon bars are under somewhat less pressure from jobbers.

"That's an Unusual Handling Problem—Let's put it up to MATHEWS Engineers"

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However, these buyers are still taking all they can get in the way of small sizes. Small forgers are booked six to eight months ahead and are pressing for tonnage. Manufacturers of large forgings are buying on a modest scale, although they are really covering on more steel than anticipated a short time ago, due partly to substantial requirements of electrical equipment manufacturers. Alloy bars continue in light demand.

Cleveland—No easing in supply of bars is noted in this district, although mills have been making steady progress in their efforts to bring shipments up to schedule. Some midwestern mills were forced to close down recently due to a shortage of fuel oil and they are still operating on meager supplies. All sellers have large order backlogs, especially in sizes 1½ in. and smaller.

Seattle — Rolling mills are at peak production in this district, backlogs of some items running to the end of the year. Improved scrap supplies indicate that semifinished steel will be produced in sufficient volume, barring a steel strike, to maintain present high rate of rolling schedules for a long time. Mills are in a position to refuse undesirable business and to take care of regular customers. Merchant bars continue in good demand, but bulk of production in bar mills is reinforcing.

Steel Plate . . .

Plate Prices, Page 145

Pittsburgh—Mills have been unable to make any headway against order backlogs in recent weeks due to steady heavy volume of incoming orders for tank, barge and similar type work. Of particular significance in producers' order scheduling are the additional commitments for the 10,000-monthly freight car construction program. In some instances, railroad tonnage requirements will force postponement of projected deliveries to fabricators. Most fabricators are well behind delivery schedules due to disruption of production schedules by shortages of steel and industrial gas to date this year. Some interests are turning down a considerable number of jobs due to extended deliveries and because the class of work in some instances would require an abnormal number of man hours in relation to the value of finished job.

New York—Little easing is noted in plates, with producers generally booked up solidly over the remainder of this quarter and those who are accepting tonnage unable to promise anything much before the latter part of the third quarter or early fourth quarter. Certain producers are virtually out of the market for the entire year. Special interest continues to be centered on light gages, for light tank work and car construction and repair. While some producers are not far behind on current commitments, this has been due to highly selective action in the acceptance of tonnage and in certain instances to partial cancellation of orders by the producers.

Boston—Demand for plates has eased slightly, although users still press for delivery. Tank and boiler shops are frequently unable to maintain balance between heads and plates and those fabricating weldments of heavier sizes are also pressed for steel. Improvement in heavy plate supply is expected soon and possibility by late third quarter in lighter

gages. Lack of plate inventories at warehouses restricts fill-in buying. Prices present another problem to the plate fabricator; several quotations are billed consumers currently, making for difficulty in estimating and quoting firm prices for heavier fabricated products. Balance of supply with demand is expected to be reflected immediately in the price structure, once the two narrow.

Philadelphia — Government recently placed all export plate tonnage under license, with applications for licenses for this quarter having had to be in by Apr. 15. General expectation is that exports will be restricted as compared with the first quarter. However, if exports are curtailed, it will be largely because of the urgency of domestic demands, especially for the freight car program, which means that schedules will remain as tight as ever. The light gages, 3/16-inch and 1/4-inch thicknesses, are in urgent demand. In addition to railroad equipment requirements, these gages are needed for light tank work, breechings, etc. They have been under particularly heavy demand ever since the end of the war.

Certain mills, selling broadly on a quarterly basis, have accepted some tonnage recently for July and August shipment. Some, not selling on a quarterly basis, are accepting tonage for late third quarter and later in the year. Still others are remaining virtually out of the market.

Chicago—One important platemaker here is opening books for last half of 1947 and is notifying customers that quotas must be cut moderately because of the expanded freight car building program over balance of the year. Demand for plates holds at heavy volume, principal requirements coming from tank makers, pipe line fabricators, heavy machinery, and the like.

Seattle — Plate inventories are inadequate to meet current demands, some shops confining operations to small jobs in line with materials on hand. The shops are handicapped especially by scarcity of stainless sheets. Tank and pipe jobs are in fair volume at a majority of plants.

Wire . . .

Wire Prices, Page 145

Chicago—Demand is holding strong for all wire and wire products except rope, and sales of this commodity are increasing. While wiremakers are unable to ship manufacturers material in the volume required, there are some indications that requirements may suffer some shrinkage in the not too distant future. Consumer and retail store resistance to present high prices of goods may soon be reflected in reduced manufacturing operations. This, however, would only serve to reduce mill backlogs. Demand is intense for barbed wire and steel posts, now that weather will permit field work on a broader scale.

New York—Slightly more low carbon bright basic wire is available, but no improvement in the supply of rods is noted. A few cancellations include bed springs and upholstery wire, but these openings are readily taken up in other directions. Stapling wire requirements are far in excess of prewar levels, also resulphurized grades. Steel wool wire is slightly less active; consumer price resistance had made it possible for wool producers to pass on the full increase

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Boston—Firm policy against deferments beyond fourth quarter is being adopted by one eastern wire mill; outright cancellation of the tonnage is asked if deferment is into next year. Only in scattered cases are deferred shipments requested, usually due to unbalance in consumer inventories. New buying continues at high levels, although somewhat less active in some directions. Automobile requirements are maintained and some industries are after more tonnage, one being clock assembly plants for high carbon flat material. Among the softer spots is stainless; some mills are looking for volume. Screw manufacturers, requiring more sizes and grades than most users, are having difficulty in balancing inventory. Unable to get rods for redrawing to size, higher ratio of drawn wire is required. Lack of rods, including balance in sizes and grades is also retarding non-integrated mills as the trend continues toward carrying more semi-finished into finished and more profitable products.

Revised Extras Effect Cut In Some Wire Product Prices

Cleveland—Revisions in extra charges on hot-rolled wire rods, welded wire fabric, and certain types of manufacturers wires, which in the aggregate result in price reductions, were announced last week by American Steel & Wire Co., subsidiary of United States Steel Corp. The revised extra cards are the result of a careful study and reflect technological improvements in the science of steelmaking over the past decade. The revisions result in simplification of the "extra" structure.

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Structural Shapes . . .

Structural Shape Prices, Page 145

Chicago—Of 36,000 tons of sheet piling needed by the city of Long Beach, Calif., on bids taken Mar. 26, 18,507 tons has been purchased from Carnegie-Illinois Steel Corp. This order, it is understood, constitutes the largest single sheet piling order booked by the company. A total of 12,979 tons of MP-101 and M-102 piling will be rolled in the Chicago district and 5528 tons of MZ-38 section will be rolled in Pittsburgh.

New York—Structural activity continues to lag, and at least one eastern fabricator, after a period of several months, is now back in the market actively soliciting tonnage. In addition to high costs, the possibility of a steel strike next month appears to be having a dampening effect on structural demand, with few outstanding orders reported. However, there is a fair amount of new work, with the Colonial Village housing project in upper Manhattan, involving 7000 tons, again becoming active. Several hundred tons of school work have recently come for figures, and bids were closed a few days ago on 2200 tons for a truck terminal in lower Manhattan for the New York Port Authority. However, not even new inquiry is nearly as brisk as anticipated earlier in the year.

Boston—Slackening new inquiry for fabricated structural steel is accompanied by some inroads on backlogs by district shops despite tightness in plain material beyond limited quotas. Procurement of steel continues a major factor, but new contracts for fabricated tonnage are declining. Bridge inquiry is low for this season, under 1500 tons up for estimates; except for a 950-ton superstructure, Hampton Harbor, N. H., these are small stringers and I-beams requiring little shop work. Largest district industrial project under way is plant 7, Norton Co., Worcester, Mass., for which American Bridge Co., Pittsburgh, will fabricate around 1500 tons. Miscellaneous industrial demand from builders of equipment is generally maintained and lack of structural steel in warehouse stocks hampers procurement with some buyers in this category.

Seattle — Steel fabricators are seriously handicapped by shortage of materials and for this reason some plants are confining current operations to numerous small jobs which aggregate a considerable volume. Sale of a number of prefabricated standard steel frame buildings is reported.

Plan Immediate Construction of Huge Bomber Hangar

Washington — A reinforced concrete hangar, reputed to have the largest span of any hangar of this type constructed to date, 340 feet wide, is being designed for immediate construction at the heavy bomber base at Rapid City, S. D., under supervision of the Corps of Engineers,

War Department. The new hangar, which will cost about $1 million, is of arch-type monolithic reinforced concrete construction having a door opening 300 feet wide by 40 feet high. The roof structure is divided into units separated by expansion joints. Each unit consists of a cylindrical sheet about 3¾-inch thick which is stiffened by its curvature and by supporting arches, columns, horizontal edge members and curved stiffening ribs at the expansion joints. Side walls are of conventional masonry design with metal sash and doors.

Tubular Goods . . .

Tubular Goods Prices, Page 145

Pittsburgh — The extraordinary heavy order backlog reported by mills, extending into 1950 on some of the larger sizes of line pipe, is said to stem from pent-up demand for increased crude oil facilities and installation of residential and commercial gas heating. Demand-supply outlook for seamless and electric weld tubing is somewhat more promising with some mills in position to make slightly more reasonable delivery promises. Sellers note more hand-to-mouth buying on part of consumers who are carefully watching inventory position. Heavy demand continues for stainless tubing particularly for 2 and 2½-inch wall. With pig iron distribution pattern expected to be on more equitable basis, following discontinuance of directive tonnage for federal housing program except for soil pipe allotments, cast iron pipe producers are hopeful that output can be stepped up in near future. Cast iron pipe producers' order backlogs are extended 15 to 18 months, with result much municipal work is being held up.

Seattle—Cast iron pipe agencies are concerned with cleaning up order files. Few deliveries are scheduled for 1947, a majority of backlog orders being for delivery next year. No important bids were opened last week. Demand continues unabated, however, and several sizable projects are to be up for bids soon.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 144

Pittsburgh — Producers continue to book tonnage on a restricted basis, taking into consideration extent of freight absorption and present and future customer relationships. No headway has been made against extended order backlogs in recent weeks despite this selective selling policy. In fact, output is exceeding that recorded during the closing months of last year and is comparable to average monthly production during 1939. However, demand is more than double that experienced in 1939, with the result many new inquiries must be rejected, and there is good prospect of still further increase in overall requirements. One aspect of the present distribution policy is that producers are not selling as many bars to outside fabricators. As in merchant carbon bars, some easing in demand is noted for larger rounds.

Philadelphia—Demand for reinforcing bars is featured by the placing of 400 tons for an addition to the Adam Scheidt brewery, Norristown, Pa., through Turner Construction Co., this city, to Bethlehem Steel Co., Bethlehem, Pa. However, there is a fair sprinkling of state bridge and road work, various orders now averaging possibly 500 to 600 tons per week. Among the few current structural orders are 200 tons for factory building for Berwick Weaving Inc., Berwick, Pa., placed with Bethlehem Steel Co. and 170 tons for a state bridge between Lancaster and Chester counties, Pennsylvania, placed with American Bridge Co., Pittsburgh.

Seattle — Heavy awards for light reinforcing bars for the Columbia basin project featured the market last week, the total being about 2500 tons. Local mills report a good volume of jobs in less than 100 tons each.

Tin Plate . . .

Tin Plate Prices, Page 145

Chicago—Producers of tin plate continue to be pressed by consumers for more material and increased quotas, but are unable to do either.

Extension of government allocation for export through second quarter means that quotas must remain virtually unchanged. At the same time, with both tin and black plate available in restricted supply, production of tin plate cannot be raised much above the present level. Output is moving from mills about as fast as prepared for shipment, despite short supply of box cars.

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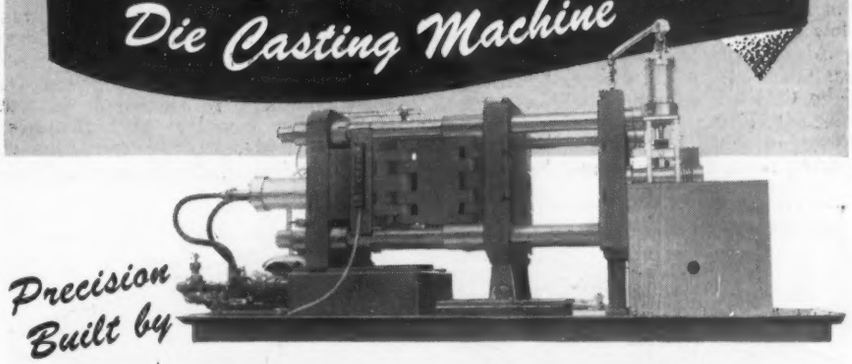

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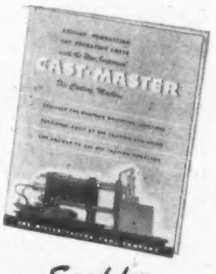

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Pig Iron . . .

Blast furnace operations recover from effects of coal mining curtailment

Pig Iron Prices, Page 146

Chicago—Foundries in this district are heartened by the fact that pig iron production here did not suffer because of the recent memorial holiday in the coal mines. Inland Steel Co. did not bank, as planned, its one blast furnace making merchant iron and present indications are that coal mining has returned to a level which removes the threat for the present. Getting more iron than they have for many months, foundries have pushed their operations up to the highest level which supplies of iron, coke and manpower will permit. Some shops have had their coke supply narrowed by the strike at the Citizens Gas & Coke Utility in Indianapolis.

Pittsburgh—Sharp increase in pig iron output occurred here last week as result of full scale resumption of coal mining operations. During the height of the coal mining curtailment, Carnegie-Illinois Steel Corp. banked two blast furnaces and reduced blast on others to equivalent output of six units, and decided to blow out the No. 5 furnace for relining at Edgar Thomson Works. Similar action was taken on the No. 4 unit at National Tube Co.'s plant here. The No. 4 furnace at Edgar Thomson Works was blown in Apr. 13 following complete relining from the mantel up. Net result of above changes leaves 42 out of 47 units in this district pouring iron.

No improvement in tight pig iron supply situation is indicated through remainder of this year. Due to this factor, plus scarcity of cast scrap at a reasonable price, a number of foundries have been forced to maintain operations well below capacity, a situation that has been further aggravated by the fact pig iron sellers in other areas have withdrawn from this market. As long as the lone merchant producer is able to meet but 60 per cent of stated requirements for district, distribution of pig iron is expected to remain under strict allocation.

Philadelphia—Office of Defense Transportation is asking car wheel makers for information as to amount of pig iron received in the first quarter and names of sources of supply. Whether this will be followed later by a request to pig iron producers to supply car wheel makers on a voluntary allocation basis, such as now prevails with respect to housing requirements, remains to be seen. There are indications that the 1500-ton blast furnace at Bethlehem, Pa., may be put in blast somewhat earlier than May 15, which was the date indicated previously. Much depends upon the fuel supply.

Boston—With the supply of pig iron improved, but still limited due partly to small shipments from Buffalo and other outside points, users of iron castings report an easing in the supply of that product, but complain of high prices and quality. Machine tool, textile equipment builders and air conditioning-heavy equipment shops are getting more castings. More foundries are offering to take on sub-contracts, while one large consumer is reviving sub-contract schedules to bring larger volume nearer the home plant, Boston district. Steel castings are plentiful and some non-ferrous shops are looking for work. While iron consumers are reluctant to tie-up for five years, no substantial resistance to the Mystic co-operative agreement plan developed; not overlooked is the retention of Everett as a basing point. Melters of basic must depend on outside furnaces, for the time at least on integrated steel-works units by at least two plants. Largest user of basic, American Steel & Wire Co., Worcester, gets iron from its own Ohio furnaces and this plant is currently well heeled. If foundry melt averages 300,000 tons annually over five years, which is conjectural, better than 100,000 tons of outside foundry iron must come into New England yearly.

Buffalo—While demand for iron has lost none of its force, producers are further plagued by shortages of coke and ore. Hopes for early opening of the navigation season to replenish depleted ore and limestone stocks were jolted during the week by heavy ice fields around the local harbor and breakwall. Disturbing the situation was a forced shutdown of a furnace for minor repairs at the Hanna Furnace Susquehanna plant. This left two idle stacks out of 16 in the area. Increased supplies of scrap may ease the market in the near future as producers transfer to additional foundry tonnage.

Cleveland — Foundries have been unable to replenish reserve stocks of pig iron, since receipts are required to sustain present high rate of operations. Flow of scrap continues heavy on old contracts, making it possible for buyers to reject tonnages which do not meet specifications. Foundry officials expect to place new contracts for scrap around the first of next month at lower price levels. Some cutbacks in orders for malleable castings have been reported but foundries still have a heavy volume of unfilled orders which assure capacity operations for several months ahead.

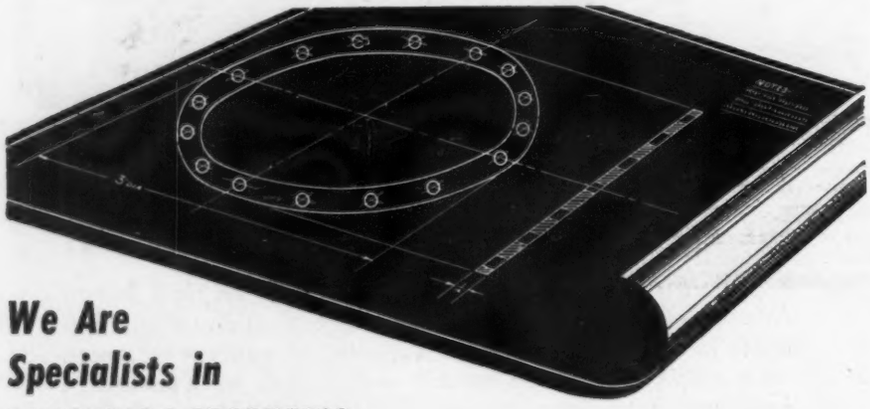
Cincinnati—Shipments of pig iron into this district are lagging, with supplies tighter than heretofore. Many melters are leaning heavily on scrap in an attempt to maintain schedules until conditions at furnaces, caused by stoppages in the coal mines, are relieved.

Birmingham — Production curtailment resulting from the coal mine shutdown widened the margin here between supply and demand for pig iron.

Iron Ore . . .

Iron Ore Prices, Page 146

Cleveland—Shipments of iron ore from Duluth, Two Harbors and other upper lake ports have begun to move, although ice is preventing rapid passage of ships through St. Marys river and other ship channels in the upper lakes. Ice breaking by several Coast Guard cutters is proceeding, and the MacArthur lock at the Soo has been filled in preparation for the first of the fleet which will go through it. The lower lakes have been partially opened for some time and several boatloads of ore from Escanaba, Mich., have reportedly arrived at Indiana Harbor, Ind.



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Scrap . . .

Prices tend lower as consumers generally remain out of market

Scrap Prices, Page 150

Pittsburgh — Mills have been able to augment scrap inventories in recent weeks on shipments from customers on a reciprocity basis and in winding up old orders placed with dealers and brokers. There is very little tonnage left on old orders, reflecting unusual heavy shipments the past month and fact producers have canceled those orders which expired. One mill is reported to have canceled a sizable tonnage on order before expiration date.

Mills' position in staying out of the market has been enhanced by recent accumulation of scrap despite near capacity operations, and threat of steel strike early next month. In view of the determination of the mills to withhold buying under present conditions, price for open-hearth scrap grades cannot be maintained at $38. Despite the absence of an actual sale, the local market for open-hearth grades is now considered at $35 based on an offer of 5000 tons to Carnegie-Illinois Steel Corp., which was refused. Fact that old orders have been largely cleared up and in absence of new buying by the mills, current scrap quotations are based on reported offerings by dealers and brokers. On this basis heavy melting steel, busheling and bundles are placed at $35; machine shop and short shoveling turnings between $27.50 and $30; and electric furnace grades, $41 to $42. With open-hearth grades quoted around $29 in New England and $31 in New York, the indicated price for remote scrap delivered Pittsburgh falls within the range of $35 to $37.

Railroad heavy melting steel is still at the $38 level with usual differentials for specialties and other items. Cast grades remain very strong with No. 1 cupola selling within the range of $43.50 to $44.50.

Some dealers and brokers express the opinion that while the scrap market is definitely weakening, it is not improbable that prices might again move upward should the mills enter the market at one time. However, this opinion is discounted by many on the basis that mills are obtaining a substantial portion of their purchased scrap requirements on direct dealings with customers, while supply of available material should steadily increase with more open weather permitting greater segregation and collection activity. Record peacetime steel production to date this year also has made possible steady improvement in metalworking operations which in turn has substantially augmented industrial scrap supplies. Concerted efforts also are under way to break loose considerable scrap tonnages now in hands of government agencies and from battlefield areas.

New York—In the absence of important consumer buying, brokers' buying prices on heavy melting steel have declined here to $31 to $31.50. These prices also apply to No. 1 busheling and No. 1 and No. 2 bundles, with No. 3 bundles now holding at $29 to $29.50. Machine shop turnings and mixed grades have also dipped, brokers offering $20 to $21. Short shoveling turnings are down from $23.50 fob shipping point, to

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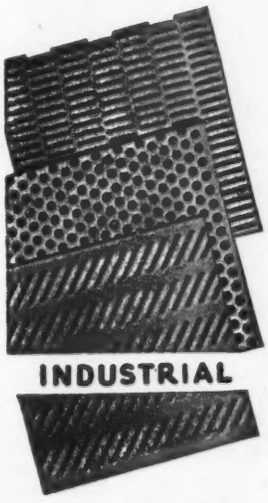

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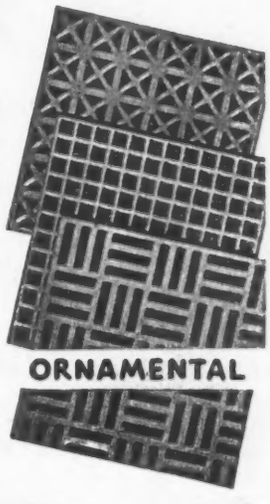

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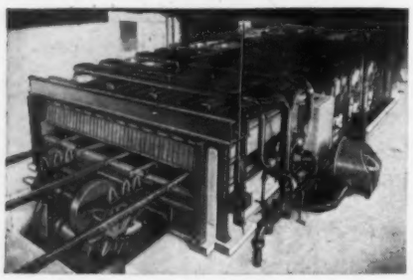
A modern R-S continuous cast-iron pipe annealing furnace of the type shown is now under construction for Glamorgan at Lynchburg, the oldest cast iron pipe foundry in America. Pictured is discharge end showing control valves, Spencer Blower, and alloy fingers on conveyor. The unit shown is gas fired, and has a capacity of 30 to 120 pipe per hour, or 25 tons. The furnace is 22 feet wide and handles 20-foot lengths.



Similar furnaces are in use at U. S. Pipe Co. plants in Alabama and New Jersey; National Pipe Co. in Birmingham, James Clow Company, in Coshocton, Ohio, and the Lynchburg Foundry Company in Radford, Virginia.

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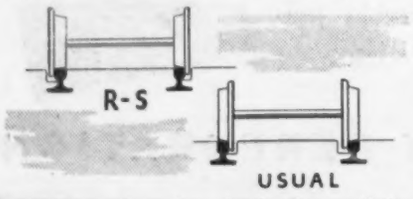

R-S car-hearth wheels have their flanges outside so that wheels function easily regardless of thermal expansion.

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PHILADELPHIA 44, PA.

$22 to $22.50. Punchings and plate scrap and cut structurals are $32 to $33, with brokers showing little interest. Electric furnace bundles are $32 to $32.50 and No. 1 chemical borings, $24.

No. 1 Cupola cast is unchanged at $41 to $42, with charging box cast down about $1.50 to a spread of $39 to $39.75. Unstripped motor blocks are off slightly to $41 to $42. Malleable is nominally unchanged at $48 to $49.

Philadelphia—Scrap prices generally continue to ease, with No. 1 and No. 2 heavy melting steel, No. 1 busheling and No. 1 bundles now holding at $33 to $34, delivered. Tonnage is moving freely and consumers are buying cautiously. However, despite general weakness, some prime railroad scrap offered recently brought prices substantially above the present heavy melting steel price range. No. 3 bundles are now $31 to $32, delivered; machine shop turnings, $24; mixed borings and turnings, $22 to $23; and short shovel turnings, $24 to $25. Low phos grades are off about 50 cents a ton, with bar crops and plate, punchings and plate scrap, and cut structurals holding at $36.50 to $37.50. Electric furnace bundles are off 50 cents to $34.50 to $35.50, with heavy turnings and No. 1 chemical borings unchanged. Cupola cast and clean auto cast are easier at $47 to $49; charging box cast at $44 to $45; heavy breakable cast, $44 to $44.50; and unstripped motor blocks, $44 to $44.50. Malleable and No. 1 wheels are steady.

Boston—Steel scrap tonnage is offered in heavier volume as yards seek to move material before prices go lower; for heavy melting $28 shipping point is top for some consumers and while light grades tend to sag lower. Cast grades hold at high levels and are not following the reaction in steel scrap. Limited supply and strong demand is the answer. Machinery cast is bringing as high as $50, delivered Connecticut. For cleaned motor blocks and heavy breakable cast, $38 shipping point is offered for outside shipment.

Buffalo—Falling prices and pronounced weakness dominate the scrap market. The two leading mill producers have temporarily withdrawn from the market. This action followed sales of heavy melting and bundles at $35 a ton, a drop of $2 from the previous transaction. The buying mill refused to take additional tonnage at the lower figure and dealers were speculating on future prices. Shipments to mills have reached a low ebb. In some instances, scrap is accumulating in rather sizable quantities in dealers' yards. This is tending to depress market sentiment. Dealers also were confronted last week with a mill's refusal to accept turnings on shipments. Discussion on prices placed heavy melting anywhere from $30 to $35 a ton, with the quoted range $33-35. Machine shop turnings were down to $23-24 while short shoveling turnings slipped to $25-26. A marked increased has been shown in available supplies.

Chicago—Although steel mills here are holding to their offering price of $33.50 delivered for open-hearth scrap, almost no buying is being done, with result that the market has had no good test. Activity consists mostly of the fulfillment of old orders at the $36 level, but within another week or ten days these will have been completed and by that time some test may be made. All evidence indicates that further settling of price may be not far away.

Cleveland—Scrap consumers remained out of the market in this district last week, since they are receiving adequate tonnages on old contracts to sustain operations. Consumers are expected to come into the market around the first of next month at a lower price level, although the market already has dropped $6 to $8 from the peak levels paid for remote scrap a month ago. Both foundries and steel mills are requiring strict adherence to grading specifications and large tonnages, of high priced material, often coming from distant points, are being rejected.

Detroit — Principal local buyer has canceled all old orders and placed open orders to the end of the month at a price of $4.50 per ton under the former buying level. Purchases hitherto had been on the basis of the so-called General Motors formula, or $15 over the original OPA price ceiling. Brokers believe further downward adjustment of scrap prices may come next month, but expect a relatively stable and free market by June 1. The practice of earmarking scrap for specific mills is gradually being washed out, following refusal of at least two outside mills to accept scrap channeled to them, except at $6 per ton below the "formula" price. Bearish sentiment is reflected in further downward revision of prices on steel grades by $1.50 per ton to $30.50-$31; by 50 cents on machine shop turnings to $24.50-$25; by 50 cents on short shoveling and borings to $25.50-$26; and by $1 on electric furnace material to $35-$35.50. Cast grades are weak but unchanged.

Cincinnati—Prices on cast scrap are holding firm as foundries seek tonnage to offset deficient shipments of pig iron. Steel grades are unchanged but appear softer, due to recently augmented consumer inventories and an upturn in offerings.

Birmingham — Although abnormal tonnages of materials are being offered here, few consumers are placing any new orders and price quotations for the most part are those of last purchases. Mills have been able to build up inventories and other factors tending to slow down buying activity are the possibility of a steel strike and high prices being asked.

St. Louis—Overall scrap prices continue to weaken as most mills limit orders to fill-ins. Mill reserves have reached 30 to 45 days, regarded as ample under current price trends. Scarcity of pig iron is the main supporting factor. One mill, hit by the 50 per cent shutdown of local pig iron output, is buying substantially in cast as an iron substitute. Foundry inventories have remained about 30 to 45 days for several weeks, normal for this period. Recent strong Chicago buying in this district is down to a trickle, further contributing to weak prices here. Shipments have been up substantially for several weeks. Railroad scrap especially is coming in to take advantage of the good market.

Seattle — Steel scrap is flowing to steel mills in increasing volume and operators believe the supply crisis has passed. Recession of the eastern market has had a salutary effect upon the market in this area, eastern buyers having retired from this territory after having purchased a small amount here during the recent shortage. Local prices are firm at $20, fob mill, and receipts are now in excess of consumption.

Warehouse . . .

Distributors revise prices in line with revisions made recently by mills

Warehouse Prices, Page 147

Pittsburgh — Distributors' price structure continues in a state of flux, reflecting downward adjustments in size, quantity and chemical requirement extras recently established by the mills on hot and cold-finished bars, plates, shapes and sheets; also due to increased trucking costs. Warehouse interests have established the following price revisions to date to reflect above factors, with similar adjustments for other products also indicated soon.

Item quantity warehouse extra for cold-finished rounds 6-in. and under (within which size range bulk of tonnage is shipped) have been reduced $5 a ton for item quantities under 300 pounds, and within bracket ranges 300 to 499 pounds and over 1000 pounds; no change has been made in quantity bracket range 500 to 999 pounds. For wide flats over 6 inches in width, an additional warehouse size extra of $1.50 over mill extras now applies; previously this extra was $1. The same $1.50 warehouse size extra also applies on sizes over 6 inch rounds, formerly this extra applied over 6½-inch rounds. All sizes, shapes and finishes of cold-finished carbon bars can be combined on any one order to justify the minimum $2.50 quantity extra and thus avoid the $4 quantity extra when total order is less than 300 pounds. This quantity extra formerly was $3.

The warehouse base price on plain plates has been revised to $4.15 per 100 pounds to reflect revision in mill specification extra for ASTM-A742; a reduction of $1 per ton. No similar price adjustment has been made in floor plates for this item did not involve the mill specification extra. However size extras for floor plates have been revised as follows: ¼ to 5/16-inch now is 10 cents, formerly 15; for 3/16-inch now 20 cents, previously 30; no changes for other sizes. The size extras for plain plates have been similarly revised. Distributors also have adjusted specifications on high carbon (0.40 to 0.50 per cent) plates to 0.35 to 0.40 per cent, which reduces analyses extra $5 a ton.

Warehouse steel price spread between country and city delivery price bases has been increased to 15 cents per 100 pounds, up $1 a ton on all steel products handled with exception of alloys. Distributors state sharp advance in trucking costs have made this move necessary.

New York—Warehouse distributors now look to the third quarter before any substantial improvement develops in supply of carbon products, including flat-rolled, structurals and plates. For these, demand is heaviest and sales volume will be regulated by available stocks over the next two months at least. Actually there is no concrete evidence that tonnage from mills will increase next quarter, but an improved supply of cold-finished bars in sizes down to one-half inch is developing; alloys balance demand, also cold-drawn seamless tubing, although electrical welded tubing is short due to limitations in strip. Bar shapes, angles and small structurals are now in shortest supply with some distributors.

Boston—While stocks of alloys, in-

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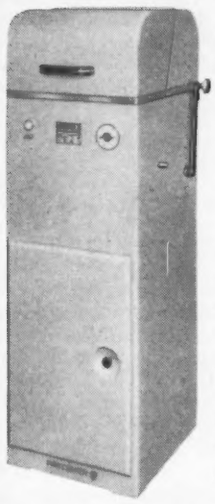

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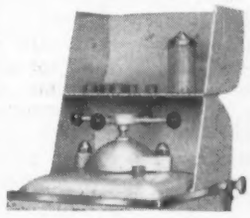

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cluding stainless products, tool steel and other specialties balance demand, overall warehouse sales volume is restricted by shortages in light carbon products, notably sheets. Inventories of structurals and plates are low and distributors are generally unable to meet fill-in demands. In both products, notably plates, spreads in mill prices are prevalent. Cold-drawn bars and lighter plates are lower under revised mill extras. Unless the unexpected develops and more spot mill tonnage appears, warehousemen look for no supply improvement in most active carbon products this quarter, but are hopeful for better allocations and quotas in the third.

Cincinnati—Warehouse volume is being maintained at previously established levels. This is possible because of a demand which is so great that stocks of wasters, odd specifications, etc., can be moved readily. Labor shortages continue to slow up handling. Jobbers were deliberate in announcing price adjustments, anticipating further changes.

Seattle — Jobbing houses report a sustained overall demand for steel products, but inventories continue small and in view of the strong movement it is impossible to accumulate stocks of staple articles. Recent mill price reductions are for the present confined to extras, base prices being unchanged. Eventually it is expected decreases will affect base levels. Scarce items, particularly sheets, show no improvement in supply while demand continues heavy.

Los Angeles — With the exception of carbon plates, which have been lowered to 5.10c from 5.20c, warehouse steel prices are holding firm here.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 145

Pittsburgh—Bolt and nut producers state incoming orders still exceed output in most instances, with order backlogs extending 6 to 8 months. While pressure for early delivery on larger sizes has eased considerably, no tapering is noted in the smaller classifications. Biggest demand is for the small cold-worked items. Output of fasteners has recovered from the sharp drop registered during the industrial gas shortage period earlier this year. However, adequate steel supply remains a disturbing factor, a situation that has been accentuated by threatened steel strike.

WAA Sale of Surplus Nuts, Bolts Under Investigation

Disclosures relating to the sale of upwards of 100,000 tons of surplus bolts, nuts and fasteners by the War Assets Administration have been made to the House Select Committee To Investigate Disposal of Surplus Material. Testimony at the hearings reported all ferrous and nonferrous surplus fasteners held by WAA up to Apr. 8, 1946, were sold on that date to a Detroit company for $22.50 per long ton, less 10 per cent discount for cash. At that price the material cost the company $1,350,000, whereas it was estimated to have a scrap steel value of $2,475,000 and a usable material value of at least $15,610,000.

Since that time, it is reported by Herman H. Lind, president, American Institute of Bolt, Nut & Rivet Manufacturers, Cleveland, who testified at the hearings, further sales as late as Feb. 25, 1947, were made to the same company at that price, despite the fact that WAA had reportedly stopped deliveries to the company, which is now suing WAA for the balance of tonnage.

Mr. Lind said he had heard of the deal last April and thought the $22.50 per ton price was "ridiculous," even before learning some of the material was copper, brass and aluminum fasteners, as well as some aircraft-types valued as high as $2700 per ton. Mr. Lind told STEEL's reporter, after hearing of the deal he had written letters to 53 established bolt, nut and fastener producers asking if they had been given an opportunity to bid on the material. Of the 47 who replied none reported any knowledge of WAA's offer.

A. E. R. Peterka of Lamson & Sessions Co., Cleveland, told the committee that WAA rejected his company's offer to purchase surplus nuts and bolts after he had learned of the Detroit company's contract.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 146

Washington — Colorado Fuel & Iron Corp. has purchased the government-owned by-product coke oven plant and a steam generating plant located within Colorado's property at Pueblo, Colo. These facilities were sold for $2,750,000 and were operated in part during the war years by the purchaser. Facilities include 74 Koppers Becker type coke ovens, having a capacity of 325,000 net tons of coke per year together with the by-products, an exhauster building, sulplate storage building, etc. Though fully completed, the coke ovens have never been in operation but it is the intention of Colorado Fuel & Iron to place the facilities into immediate operation to meet urgent demand for coke.

Canada . . .

Toronto, Ont. — Following a statement by C. D. Howe, Minister of Reconstruction, that expansion programs by the Steel Co. of Canada and Dominion Foundries & Steel Ltd., both of Hamilton, Ont., have made Canada almost self-sufficient, and no longer dependent on imports of steel plate and cold-rolled sheets, H. G. Hilton, president, Steel Co. of Canada, stated that strikes and labor troubles had set back Canada's independence of imported steel by at least one year. Mr. Hilton pointed out that delay in completion of a multimillion dollar expansion program at the Steel Co., caused by shortages of labor and strikes affecting material supply to contractors, had set back Canada's independence in the matter of steel plate and cold rolled sheets production until early next year. Since 1939, Steel Co.'s production has increased two and one quarter times. With keen demand for steel continuing, a federal government ban on exports, introduced during the war, continues.

Although two major projects at the Hamilton works of the Steel Co. of Canada were expected to be completed at an early date, problems in construction and related industries have deferred completion until early in 1948.

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Senate Group Makes Study Of Steel Supply Situation

(*Concluded from Page 61*)

ing erection. The senators thought such an arrangement would help keep independent fabricators and erectors in business and might cause more competition and save the government money.

Mr. Johnson, who is general manager of sales, Fabrication Division, Bethlehem Steel Co., did not think such a policy would bring uniform results. First it would not remove the basic cause of most of the present trouble, namely the scarcity of structural steel and the resulting necessity of allocating it to old customers. Also such a policy might cause certain companies to refrain from bidding. Bethlehem, for example, would not have bid on the Fort Hamilton Veterans Hospital in March on steel alone because at that time Bethlehem needed work for its large erection crew in New York.

Mr. Johnson said Bethlehem, during the past year, has sold 85 per cent of its structural steel production as plain material and it has erected only 48 per cent of the fabricated tonnage it shipped during that period. These figures, he thought, proved that independent fabricators and erectors have plenty of opportunity to get business based on Bethlehem's production.

Combined Contracts Favored

One reason for Bethlehem's activitiy as an erector, Mr. Johnson said, is that general contractors insist on placing one contract covering both fabrication and erection, thus having but one party to hold responsible. Fully 95 per cent of New York contractors insist on placing combined contracts.

He told the committee Bethlehem has only one structural steel price for all fabricators and even charges this price against its own Fabrication Division. He acknowledged that the custom of the steel companies to quote prices in effect at time of shipment has caused difficult problems for public procurement officers. Bethlehem now is applying a policy of quoting firm prices on public work.

Mr. Johnson commented that, "There should be an easing up of conditions so that the mills by the middle of this year should be able to take care of their customers." But he went on to say this prediction applied to structural steel only and not to sheets and certain other items which will continue scarce for some time to come. A gratifying recent development which will have an effect on fabricated steel costs in the near future, said Mr. Johnson, is an increase in efficiency of the labor involved.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

18,507 tons, sheet piling, Harbor improvement, Long Beach, Calif., for city, to Carnegie-Illinois Steel Corp., Pittsburgh and Chicago; bids Mar. 26.

1250 tons, Unit N. 18, Fisk St. station, Commonwealth Edison Co., Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; Paschen Contractors Inc., Chicago, contractor.

710 tons, continuous beam bridge over Little Calumet river, Thornton Township, Ill., for Cook county, to Bethlehem Steel Co., Bethlehem, Pa.; Arcole Midwest Corp., Chicago, contractor; bids Mar. 19.

217 tons, 159th St. grade separation, Calumet City, Ill., for Cook county, to Bethlehem Steel Co., Bethlehem, Pa.; Arcole Midwest Corp., Chicago, contractor; bids Mar. 19.

153 tons, bridge S930(2), Richland, Keokuk, Iowa, for state, to Pittsburgh-Des Moines Steel Co., Pittsburgh; bids Mar. 17.

136 tons, bridge S269(2), Delta, Keokuk county, Iowa, for state, to Pittsburgh-Des Moines Steel Co., Pittsburgh, bids Mar. 17.

100 tons, chipper and barker plant; St. Regis Paper Co., Tacoma, to Isaacson Iron Works, Seattle.

Unstated, high pressure gates, two reclamation projects, to Willamette Iron Works, Portland, Oreg.

Unstated, steel frame buildings, to Leckenby Structural Steel Co., Seattle.

STRUCTURAL STEEL PENDING

7500 tons, factory building, Caterpillar Tractor Co., Peoria, Ill.

7000 tons, Colonial Village housing project, upper Manhattan, New York city, Eggers & Higgins, architects.

1000 tons, chemistry and chemical engineering building, University of Illinois, Urbana, Ill.; bids Apr. 15.

700 tons, St. Joseph hospital, Hazelton, Pa., bids May 14.

700 tons, research laboratory, Rensselaer, N. Y., Grove, Shepard, Wilson & Gruge, 247 Park Ave., New York, general contractors.

550 tons, steel framing for North State St. viaduct, Chicago, Department of Public Works; bids May 5.

500 tons or more, Columbia river tower crossings for Bonneville Administration; Tower Sales & Engineering Co., Portland, Oreg., low, $338,781.

470 tons, bridge, Sandstone, Minn., for state.

450 tons, mill building, Korhumel, Heffron & Preiss Steel Co., Evanston, Ill.

300 tons, bus terminal, Board of Transportation, Dean St., Brooklyn, N. Y.; bids May 6.

200 tons, factory building, Buffalo; bids asked by United Engineers & Constructors, Philadelphia.

200 tons, plant addition, Armstrong Cork Co., Lancaster, Pa.; bids just closed.

200 tons, veterans apartment, Passaic, N. J., bids asked.

140 tons, sheet piling, Milwaukee, for city; bids Apr. 16.

130 tons, factory building, Du Pont interests, Newport, Del.

100 tons, garden apartment, East Orange, N. J., to be financed by Prudential Life Insurance Co., New York.

100 tons, auto showroom, Mallon-Oldsmobile, Newark, N. J., bids asked.

90 tons, two tug boats, Chesapeake & Ohio railroad.

Unstated, ventilator building, Triboro Bridge Authority, New York, bids May 6.

Unstated, addition to Public School No. 105, Bronx, New York city, bids May 2.

Unstated, addition to Public School No. 131, Queens, New York city, bids May 14.

Unstated tonnage, 325-ton gantry crane, Davis

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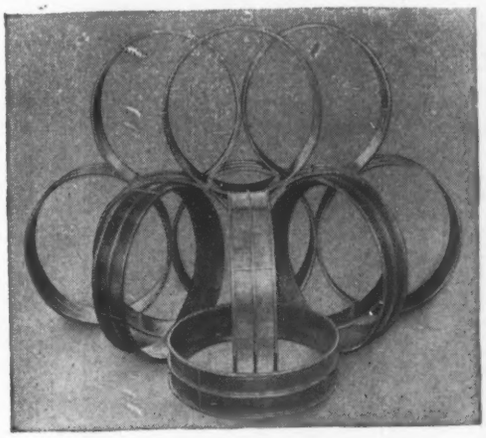

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dam, Bureau of Reclamation, Denver, Star Iron & Steel Co., Tacoma, Wash., low $306,300, fob shipping point.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2500 tons, light bars, Columbia basin project, to Southwest Steel Rolling Mills, Los Angeles; low $206,808.

1146 tons, Coulee dam pumping plant, to Sheffield Steel Co., Kansas City, Mo., $120,539.

865 tons, water storage reservoir, City of Lansing, to Capitol Steel Corp., Lansing, Mich.

400 tons, addition to Adam Scheidt brewery, Norristown, Pa., through Turner Construction Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

250 tons, engineering building, University of Washington, Seattle, to Northwest Steel Rolling mills, Seattle; Sound Construction & Engineering Co., Seattle, general contractors (previously reported 25 tons).

225 tons, Calumet Parkway, Sec. 066-0505.2, for Cook county, to Carnegie-Illinois Steel Corp., Chicago; Thomas McQueen Co., Forest Park, Ill., contractor; bids Mar. 19.

200 tons, factory building, Berwick Weavin Inc., Berwick, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

170 tons, state bridge between Lancaster and Chester counties, Pennsylvania, to American Bridge Co., Pittsburgh.

REINFORCING BARS PENDING

500 tons or more, University of Washington, Seattle; $1 million, administration building; bids about June 1; V. N. Jones, architect.

250-300 tons, Black Hawk generating station, Unit No. 4, Wisconsin Power & Light Co., Beloit, Wis.; bids Apr. 21.

220 tons, highway bridge, Monticello, Ind., for State Highway Commission; bids Apr. 15.

116 tons, housing project, Moline, Ill.; bids Apr. 15.

100 tons or more, Oregon highway projects; bids to Portland, Apr. 24.

PLATES . . .

PLATES PLACED

1000 tons, 54,000 feet, 16 to 36-inch welded steel pipe, Yakima project, to American Pipe & Construction Co., Portland, Oreg.; Scheumann & Johnson, Seattle, general contractors (previously reported unstated length).

Unstated, pipeline structures and siphon, Yakima project, to J. A. Tereling & Sons, Boise, Idaho, low, $224,453.

PLATES PENDING

1400 tons, Bow Lake water system extension, Seattle; general contract to Valley Construction Co., Seattle, low $367,760.

200 tons or more, 180-foot steel ferry vessel; bids to Oregon Highway Commission, Portland, Apr. 24 (including shapes).

Unstated, steel siphon, Willow Creek, Deschutes project, Oregon; Morrison-Knudsen Co., Seattle, low $195,161.

PIPE . . .

CAST IRON PIPE PENDING

Unstated, Sixth Ave. extension of 6 and 12-inch line, Tacoma, Wash.; approved by council; bids soon.

150 tons, for two tug boats, Chesapeake & Ohio railroad.

Unstated, 22,200 feet of 2 to 6-inch cast iron soil pipe and fittings, Columbia Basin project; bids to Coulee, Apr. 15.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago & Northwestern, 1000 fifty-ton steel box cars, to the Chicago plant of American Car & Foundry Co., New York.

Chicago, St. Paul, Minneapolis & Omaha, 400 fifty-ton steel box cars, to the Chicago Plant of the American Car & Foundry Co., New York.

CONSTRUCTION AND ENTERPRISE

CALIFORNIA

LOS ANGELES—California Hardware Co., 500 E. First St. plans a $400,000 warehouse, 136 x 120 ft. Architects are Austin, Field & Criz, 1151 S. Broadway.

OAKLAND, CALIF.—International Harvester Co., 2855 Cypress St., has awarded a $60,000 contract for plant alterations to Stolte Inc., 8451 San Leandro St.

ORANGE, CALIF.—Anaconda Wire & Cable Co., 204 N. Cypress St., will build an 82 x 182 ft addition to its factory building here. Cost will be $63,750.

RICHMOND, CALIF.—American Radiator & Standard Sanitary Corp., Prichard St., is having plans prepared for a 2-story brass manufacturing plant adjacent to its present facility here. To contain 200,000 sq ft of floor area, plant will cost $950,000. Architects are Prack & Prack, 119 Federal St., Pittsburgh.

RICHMOND, CALIF.—Standard Oil Co., 225 Bush St., San Francisco, proposes to build a $3 million grease works and packaging warehouse.

SAN FRANCISCO—Meyers Safety Switch Co., 423 Tehama St., plans a 2-story factory costing over $55,000. Engineers are Hamilton & Williges, 1540 San Pablo Ave., Oakland.

VERNON, CALIF.—General Motors Truck & Coach Division has awarded a $460,000 contract to McNeil Construction Co., 5860 Avalon Blvd., Los Angeles, for a 1-story warehouse and office building at Downey Rd.

CONNECTICUT

HARTFORD, CONN.—Jacobs Mfg. Co., 194 Newington Rd., will build a factory and alter and add to its office. Engineers for the $600,000 project are Albert Kahn Associated Architects & Engineers Inc., 7430 Second Blvd., Detroit.

HARTFORD, CONN.—Hartford Gas Co., 233 Pearl Rd., will build a generator house and blower room to cost $133,700.

STRATFORD, CONN.—United Illuminating Co., 1119 Broad St., Bridgeport, has awarded a $55,000 contract to Gellatley Construction Co., 25 Housatonic Ave., Bridgeport, Conn., for a 1-story power transformer substation.

FLORIDA

DADE COUNTY, FLA.—Miami Pineapple Plantation, S. K. Ferry, 13000 NE 6th St., Miami, has let a $150,000 contract to William B. Peterson, 166 NE 93rd St., Miami, for construction of a quick freeze plant.

STARKE, FLA.—City plans electric distribution system costing $69,159. Engineers are Reynolds, Smith & Hills, Jacksonville, Fla.

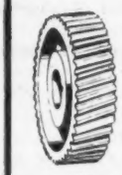
GEORGIA

ATLANTA—Acme Steel Co. has let a contract to Stratton Hard & Co., 152 Alexander St. NW, for alterations and repairs to present building, Stewart Ave. Architects are Bond & Cooper.

ATLANTA—Sherwin-Williams Co. will build a $1 million plant here with an annual capacity of 3 million gallons of paint.

ATLANTA—Union Box Mfg. Co. has awarded a $60,000 contract to Flagler Co., Techwood Dr., for addition to its plant on Glenn St.

FROM THE 1st TO THE LAST STEP



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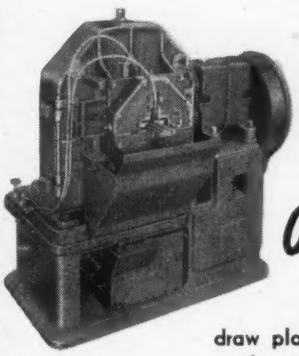

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Right: Type FW Supercharged Locomotive Diesel Engine manufactured by Cooper-Bessemer. Left: Drop-Forged Connecting Rod and Cap (forged in one piece) used in above unit.

This 70-ton switch locomotive, equipped with a compact locomotive diesel engine, is rated 660 H.P. at 1000 RPM . . . just another example of "Cooper-Bessemer Corporation at Work." Harrisburg Steel Corporation furnishes Cooper-Bessemer with many of the intricate parts for the Locomotive Diesel (Connecting Rods, Caps, Rockers and Main Bearing Caps).

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insure greater strength, reduction in weight, lower machining cost and uniform physical properties. The elements of control over every phase of manufacture from steel to finished forging enables us to manufacture drop forgings from the simplest to the most intricate design.

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Architects are Burge & Stevens, 157 Luckie St.

ATLANTA—Simmons Co. has let contract to Flagler Co., Techwood Dr., for a bed manufacturing plant costing $120,000.

BAINBRIDGE, GA.—Adel Bros. Shirt Co. plans to build a shirt factory at an approximate cost of $100,000.

CAMILLA, GA.—Mitchell County Electric Membership Corp. will spend $400,000 for system improvements and 231 miles of line.

COLUMBUS, GA.—Swift Mfg. Co. has awarded a $50,000 contract to A. K. Adams, 542 Plum St., Atlanta, for a 1-story addition to its plant.

LOUISVILLE, GA.—Jefferson County Electric Membership Corp. plans expenditure of $625,000 for system improvements and 357 miles of line.

IDAHO

IDAHO CITY, IDA.—Harris Bros. suffered fire damage of $65,000 to its sawmill and equipment. Owner plans to rebuild.

ILLINOIS

CHICAGO—Sprague Warner Corp., 2653 W. Arthington St., has awarded a $1,500,000 contract to Sherry Richards Co., 201 N. Wells St., for a plant to include three buildings.

KENTUCKY

RICHMOND, KY.—Westinghouse Electric Corp., Pittsburgh, has selected a site here for 75,000 sq ft plant for its Lamp and Lighting divisions.

MASSACHUSETTS

ATTLEBORO, MASS.—Metals & Controls Corp., Forest St., has awarded a $55,000 contract to Rowley Construction Co., 260 Central Ave., Pawtucket, R. I., for a 1-story rolling mill.

MINNESOTA

CAMBRIDGE, MINN.—Rural Co-operative Power Association proposes to alter its power plant here at a cost of $90,000. Engineer is United Engineering Service, 600 Kasota Bldg., Minneapolis.

MISSISSIPPI

CORINTH, MISS.—City has FWA funds of $800,000 for a natural gas transmission line and distribution system.

MISSOURI

ROCKPORT, MO.—Atchison-Holt Electric Co-operative has REA funds of $307,000 for system improvements and 140 miles of line.

NEBRASKA

OMAHA, NEB.—Metropolitan Utilities Distributor, 18th and Farnam St., plans a $200,000 gas storage tank. Engineer is Burgess Manchester, c/o owner.

OMAHA, NEB.—Northern Natural Gas Co., Aquilla Court, plans a 245-mile pipeline between Palmyra, Kan., and Farmington, Minn., to cost $8,500,000; a 320-mile pipeline extension to Palmyra to cost $11,325,000; and a 17-mile line from Palmyra to a point in Saunders county, Neb., to cost $675,000.

SYRACUSE, NEB.—Eastern Nebraska Public Power Distributor has awarded a $474,000 contract to Otoe Co. for 325 miles of distribution lines.

NEW YORK

BROOKLYN, N. Y.—F. C. Barschow & Sons, scrap metal dealers, will alter extensively property purchased recently on Coffey St.

RICHMOND HILL, N. Y.—Consolidated Edison Co. of New York, 4 Irving Place, New York, will soon let a $500,000 contract for an electric substation here.

WOODSIDE, N. Y.—Eagle Precision Mfg. Corp., 35 36th St. Long Island City, has abandoned a $110,000 project to build a metal products manufacturing plant at 56 Northern Blvd.

NORTH CAROLINA

CHARLOTTE, N. C.—Piedmont Steel Building Corp., Johnston Bldg., has let a contract to Southeastern Construction Co. for a warehouse.

HAW RIVER, N. C.—Cone Finishing Co. has awarded a $55,000 contract to H. L. Coble Co., Greensboro, for a finishing plant. Engineers are Watson & Hart, Greensboro.

OHIO

ASHTABULA, O.—Lake Shore Gas Co., 4505 Main Ave., plans expenditure of $200,000 for equipment to supplement its gas supply by 30 per cent.

CLEVELAND—Automotive Parts Co., 1458 E. 55th St., will use proceeds of $300,000 debenture issue for expansion and new capital financing.

COSHOCTON, O.—James B. Clow & Son suffered damage estimated at $250,000 from fire at its plant here.

EUCLID, O.—Austin Co., 16112 Euclid Ave., Cleveland, will make alterations and additions to its Bliss Rd. fabricating plant at a cost of $80,000.

KENT, O.—Kent Mold & Mfg. Co. has been incorporated with 1000 shares of no par value by Joseph Ferder, 750 Stow Ave.

LISBON, O.—Sekely Industrial Tool & Mfg. Co. has been incorporated by Carl Sekely, Lisbon Rd., Salem, O.

PAINESVILLE, O.—Coe Mfg. Co., 609 Bank St., will spend $205,000 on an addition to its plant to be used for producing plywood-manufacturing machinery.

YOUNGSTOWN—General Fireproofing Co. has awarded contract to Joseph Bucheit & Sons Co. for a 4-story plant addition, 180 x 110 ft. Project with equipment will cost over $1 million.

OKLAHOMA

WOODWARD, OKLA.—Northwestern Electric Co-operative Inc. will spend $550,000 for system improvements and 424 miles of line.

OREGON

PORTLAND, OREG.—Forest Reserve has received application for a proposed aerial railway at Mt. Hood, a $350,000 project involving steel framework, cars and cables.

PENNSYLVANIA

LUCERNE MINES, PA.—Rochester & Pittsburgh Coal Co. plans additions and alterations to its power plant which will cost $83,890.

SOUTH CAROLINA

CHARLESTON, S. C.—Virginia-Carolina Chemical Corp. plans expansion of its plant here. Blaw-Knox Co. will begin construction of project in May.

TEXAS

AGUA DULCE, TEX.—Plomo Co. will build a gas processing plant to cost $1,750,000.

CROCKETT, TEX.—Houston County Electric Co-operative has REA funds of $270,000 for 205 miles of rural electric lines.

DALLAS, TEX.—Lorch Mfg. Co., 901 Commerce St., has awarded a $90,000 contract to Lorch-Westway Bldg. Co. for a 2-story factory. Engineers are Thomas, Jameson & Merrill, 810 College St.

GILMER, TEX.—Upshur Electric Co-operative Corp. has REA funds of $275,000 for 160 miles of rural electric lines.

HOUSTON, TEX.—Consolidated Chemical Industries Inc. has awarded a $1,100,000 contract to Leonard Construction Co., 37 S. Wabash St., Chicago, and W. A. Brunet, Shell Bldg., for a sulphuric acid plant.

MERKEL, TEX.—Taylor Electric Co-operative Inc. has REA funds of $330,000 for system improvements and 298 miles of line.

NO TREES, TEX.—Shell Oil Co., Shell Bldg., Houston, proposes to build a 6400 hp compressor station costing $675,000 and storage facilities costing $300,000.

VIRGINIA

ROANOKE, VA.—Appalachian Electric Power Co., 129 Campbell Ave. E., will build a $1,500,000, 44-mile high tension line from Radford to Fieldale.

WASHINGTON

LONGVIEW, WASH.—Amidon Forge & Machine Works, 1131 California Way, plans to buy additional machinery and equipment for gear cutting and milling.

SEATTLE—Flohr & Co., metal fabricator, has awarded contract to Pacific Car & Foundry Co. for construction of craneway at 3920 Sixth Ave. N.

SEATTLE—Port of Seattle, Bell St. Terminal, plans to build a 3000-ft wharf costing $15 million. Chief engineer is G. T. Treadwell.

SNOHOMISH, WASH.—Bonneville Power Administration plans construction of a $4 million substation here. Bids will be taken in May.

SPOKANE, WASH.—Washington Water Power Co., J. E. Royer, manager, announces 1947 expansion plans call for expenditure of nearly $3 million, including $1 million for substations, meters and transformers.

SPOKANE, WASH.—Melvil Mfg. Corp., M. J. Noreen, manager, plans a $200,000 plant near Dishman, Wash., for the production of oil burners.

YAKIMA, WASH. — Yakima Gas Co., E. C. Larsen, manager, plans $100,000 expansion program, including $50,000 propane plant.

WISCONSIN

WATERTOWN, WIS.—Kusel Dairy Equipment Co., 100 W. Milwaukee St., will build a 1-story factory, 100 x 160 ft, a 25 x 40 ft boiler house and an 8 x 100 ft loading platform. C. L. Ames, 2711 N. 27th St., Milwaukee, is architect.

CANADA

CHILLIWACK, B. C.—Springbank Dehydration Co. Ltd., 528 Central Rd., proposes to build a $100,000 dehydration plant.

VANCOUVER, B. C.—Burrard Rivet & Forgings Ltd., 509 Richards St., plans a $510,000 plant expansion.

HERB LAKE, MAN.—Wekwisko Consolidated Ltd., 395 Main St., Winnipeg, proposes to start a $150,000 mining development.

ANTIGONISH, N. S.—Nova Scotia Power Commission, E. J. Cragg, manager, Halifax, will install a $100,000 power unit in Guysborough county which will include a storage dam, canal for diverting water, head point dam, pipeline, and generating station with two 1750 hp turbines and 1500 kva generators. Engineer is S. D. Fultz, c/o owner.

DEEP RIVER, ONT.—Port Hope Refinery, Port Hope, will build a refinery to treat radioactive ore from Eldorado mine at Great Bear Lake. Cost will be over $1 million.

GLENCOE, ONT.—Chrysler Corp. of Canada Ltd., 7 Tecumseh Blvd., Windsor, proposes to build a $100,000 plant.

KIRKLAND LAKE, ONT.—Casteck Mines Ltd. plans to embark on a $150,000 mining development.

ST. JOSEPH DE LA RIVE, QUE.—La Compagnie Des Chantiers Maritimes Charlevoix has awarded a $100,000 contract for a drydock to J. C. Baudreault.

ISLAND FALLS, SASK.—Hudson Bay Mining Co. Ltd., 500 Royal Bank Bldg., Winnipeg, Man., plans a 21,000 hp electric generating plant at Churchill River power plant. Cost will be $1 million.

PUERTO RICO

SAN JUAN, P. R.—Puerto Rico Industrial Development Co., c/o Theodoro Moscosa, plans a $200,000 factory.

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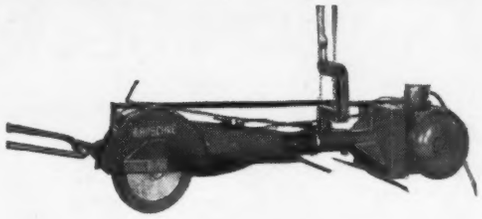

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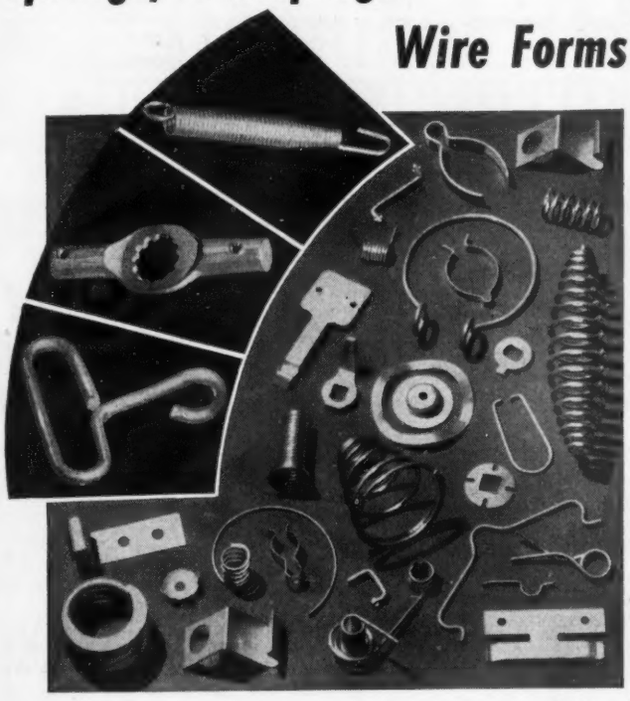

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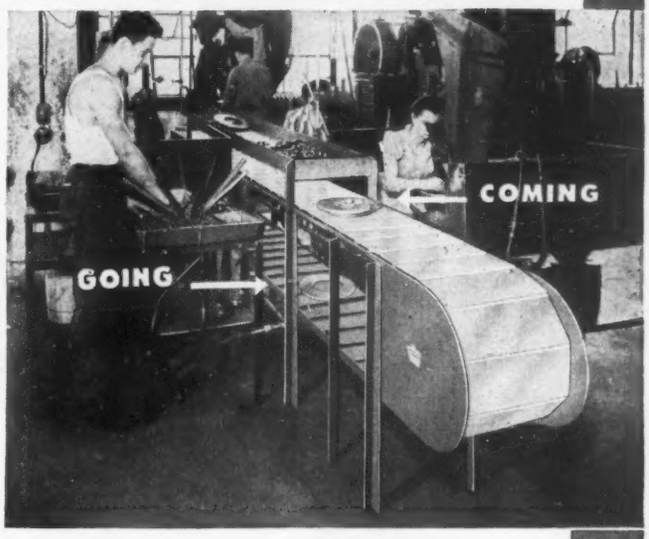

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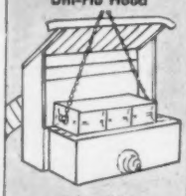

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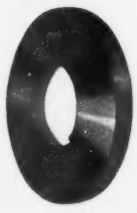

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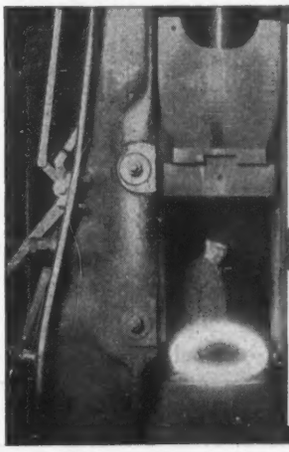

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Shepard 27'6" Span
Detroit 38'8" Span
P&H 75' Span
P&H 31'10" Span

6-Ton
Northern 46' Span

7½-Ton
Northern 26'7½" Span

8-Ton
P&H 60' Span
Hand-Operated 12' Span

10-Ton
Alliance 58'9" Span

Shepard Niles 27'7½" Span
Morgan 55'6" Span
Ederer 74'4" Span
Shepard 40' Span
2 Yd. Morgan 60' Span
Northern 49' Span
Shepard Niles 57'
P&H 87'6" Span
Niles 75' Span
Lane 60' Span
Shaw 80'9" Span
Ederer 70' Span
Toledo 77' Span
Whiting 48' Span
Shaw 67'6" Span
Morgan 38' Span

12½-Ton
Niles 75'1" Span

15-Ton
P&H 32' Span
Ederer 74'4" Span
New Albany 50'6" Span
Morgan 73'5½" Span
Morgan 82' Span
Bedford 34'6" Span
P&H 32' Span

20-Ton
Lane 50' Span

P&H 51'4" Span
Ederer 74'4" Span
Northwestern 60' Span

25-Ton
Bedford 14'6", 67'8" 46'2"
Leonard Burke 100' Span
Case 63' Span
New Albany 50' Span
Cyclops 74'4" Span

30-Ton
Ederer 55' Span
Ederer 66'6" Span
Whiting 74'4" Span
Ederer 40' Span
Northern 75' Span
Bedford 25'9½" Span
Cyclops 74'4" Span

40-Ton
Overhead Crane 150' Span

50-Ton
Morgan 50' Span
P&H 40' Span

150-Ton
Whiting 30' Span

200-Ton
Alliance 100' Span

Telephone us collect to discuss your requirements.

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49 Vanderbilt Avenue, New York 17, N. Y.
Telephone: MUrray Hill 4-1616

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Dreis & Krumpf Brake, 8 ft. outside, 6 ft. inside, perfect condition, $1975; Fay & Scott 17" swing, 8 ft. bed, back geared, compound rest, semi-quick change gears, double friction No. 263 and 10" four jaw independent chuck, also 7" four jaw independent chuck, also 16", 10" and 7" face plate, fair condition, $585; portable Arc Welder, good condition, $150; Lincoln Stationary Arc Welder, excellent condition, $150; 3 Niagara Blowers #5, #4, fair condition, $10; Buffalo Drill press #3, 220 volts, 60 cycle, perfect condition, $450; Detroit Stoker, has 25 cycle motor, good condition, $449.

Write Dept. S,
Hard Manufacturing Company,
117 Tonawanda St.,
Buffalo 7, N. Y.

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100 tons ¼" x 36" x 20 ft.
20 tons ½" x 12" x 20 ft.
20 tons ⅝" x 12" x 20 ft.
20 tons ¾" x 12" x 20 ft.
20 tons 1" x 12" x 20 ft.

KLINE IRON & METAL COMPANY
P. O. Box 1013 Columbia, S. C.
Telephones 3670 and 4-1464

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ROUND, HEX, SQUARE BARS
New York and Pittsburgh Warehouse Stocks

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P. O. Box 1647, Pittsburgh 30
Phone—Walnut 3300
Michigan Distributor
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2009 Fenkell Ave., Detroit 3
Phone—Townsend 8-1172

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½" O.D. .050 Wall 78" Long
At 25c per lb.

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55 tons Hot rolled 1/2—inch Rounds 20 ft. long

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Wanted
STEEL
Plain Rounds

Quantity	Dia.	Length
400 Tons	1/2"	32' to 36'
400 Tons	9/16"	32' to 36'
400 Tons	23/32"	32' to 36'

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spot or May June July
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PLAIN OR DEFORMED
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1/4" to 1" Diameter
DELTA CORP.
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WHitehall 4-8854

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Must be 7¼" to 14¼" wide x 55" long.
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Wanted
16 and 18 gauge Strips, Sheets or Shearings urgently required.
Dominion Skate Co.
P. O. Box 83 New Toronto, Canada

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20 Tons Of 28 Gauge Galvanized Or Zinc Plated Cold Rolled
For our own mfg. Pay up to $220.00 per ton delivered. 12", 24" or 36" wide, or use 12" x 48".
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SAE 1010 Hot or Cold Rolled Standard Mill Size Sheets or Plates in 9/64"-3/16"-¼" or 5/16" Thickness.
Write, Wire or Phone
Sizes and Quantity Available
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Dayton, (1), Ohio.
Mfgrs. Electric Motors and Grinders.

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Any Alloy
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TRinity 4713

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WO 5046

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50 tons 10" BP Beams 42#
50 tons 12" BP Beams 53#
33 tons 14" BP Beams 73#
59 tons 14" BP Beams 102#
The above items are in random lengths.
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149 pcs. 10" Jr. Beams 9# 40'
300 pcs. 10" Jr. Beams 9# 20'
64 pcs. 12" Jr. Beams 11.8# 40'
30 pcs. 12" Jr. Beams 11.8# 30'
142 pcs. 12" Jr. Beams 11.8# 60'
25 tons 10" WF Beams 21# 9 to 28'
20 tons 12" WF Beams 25# 9 to 30'
20 tons 12" WF Beams 27# 9 to 30'
25 tons 12" I Beams 50# 60'
25 tons 12" I Beams 40, 8# 60'
6 pcs. 13" Channel 50# 34'
50 tons 2x2x3/16" Angles 18to22'
50 tons 2x2x1/4" Angles 14to25'
50 pcs. 7x4x3/8" Angles 40'
122 pcs. 8x4x7/16" Angles 12to34'
10 pcs. 8x4x1/2" Angles 38'
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6 tons 7/16x4" Flat Bars 16 to 22'
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COLUMBIA, S. C.
Telephones 3670 & 4-1464

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One 40 lb. Bradley Helve Hammer
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Surplus Department
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Weedsport, N. Y.

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Bristol, Virginia

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KNOXVILLE, TENN. • PORTSMOUTH, VA.

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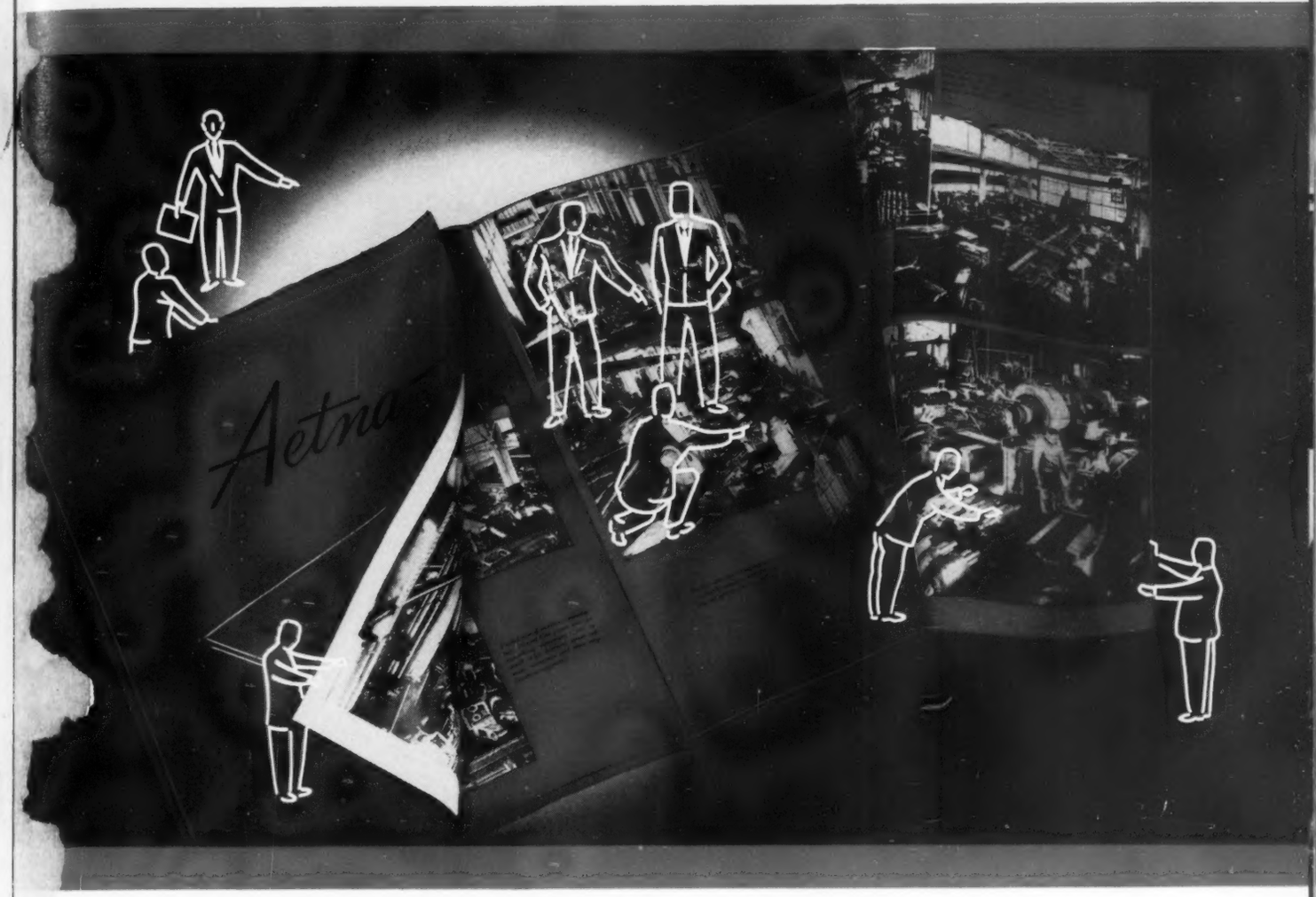

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YOUNGSTOWN, OHIO

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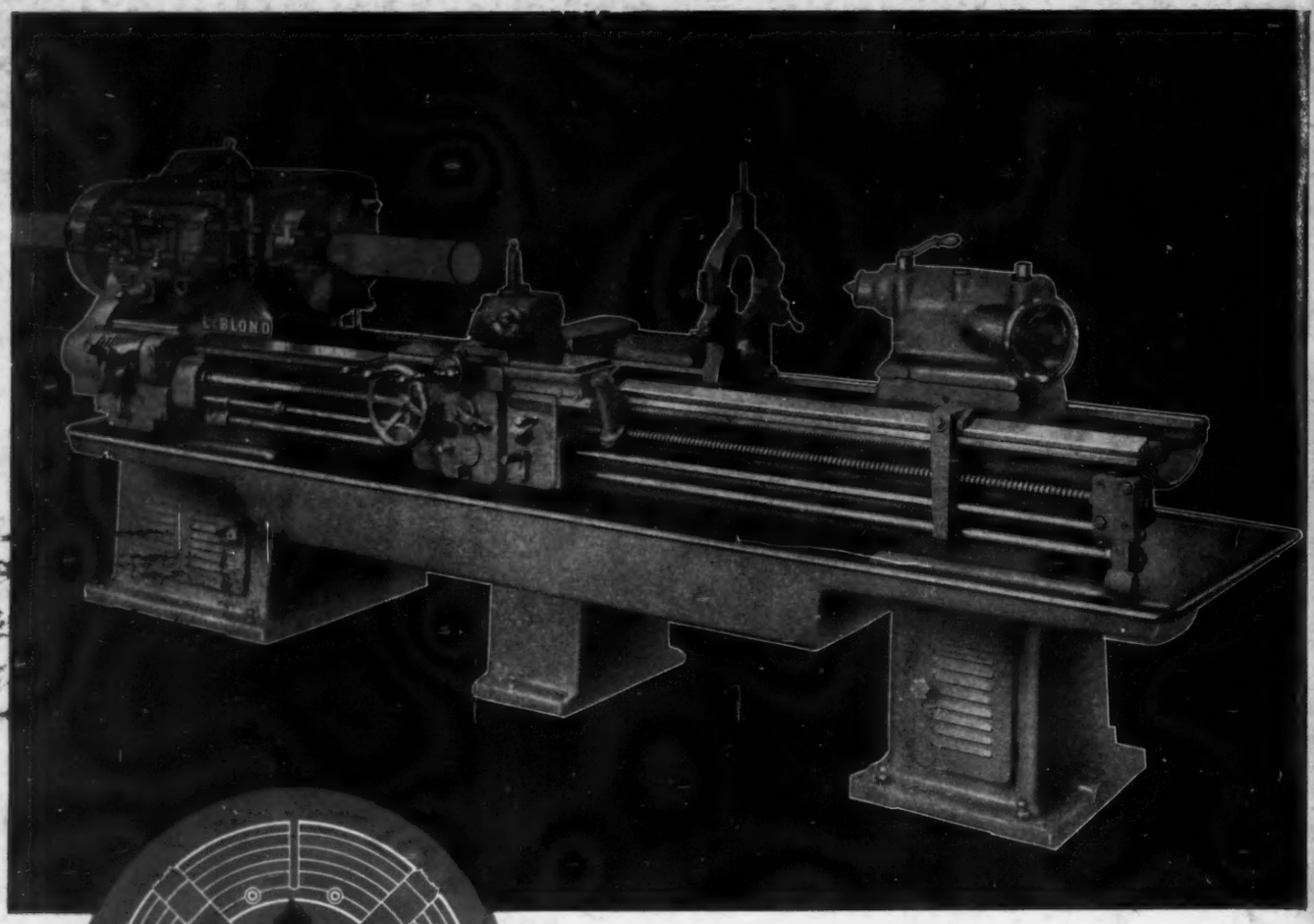

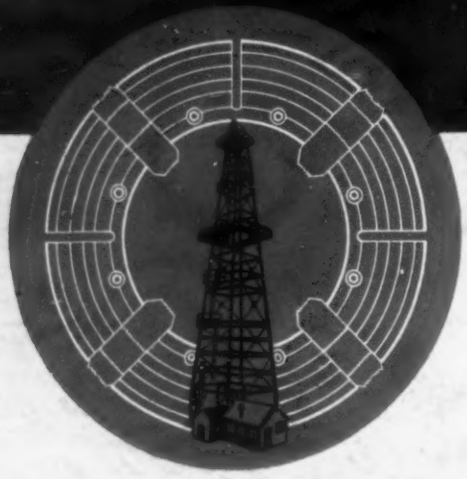

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